TENDER SPECIFICATION

No. BHE/PW/PUR/ BHUI-CLE/726

FOR

Handling at Storage Yard/ Stores, Transportation to Site, Calibration, Erection, Testing, Commissioning, Final Painting and Handing over of Electrical and Control & Instrumentation Works of Co-Generation Plant comprising of HRSG(1X62TPH), 1 X Frame 6 Gas Turbine 1X33.3 MW, Steam Unit and their Auxiliaries, Piping etc.

AT

GUJARAT NARMADA VALLEY FERTILIZERS COMPANY LIMITED
DISTT. BHARUCH
(GUJARAT)

PART-I - TECHNICAL BID

(VOLUME- I)

SPECIAL & GENERAL CONDITIONS OF CONTRACT, QR, NIT

BOOK NO.:

BHARAT HEAVY ELECTRICALS LIMITED
(*A GOVERNMENT OF INDIA UNDERTAKING*)
POWER SECTOR: WESTERN REGION
345, KINGSWAY: NAGPUR 440 001

C O N T E N T S

SL.NO.	DESCRIPTION	SECTION/ APPENDIX NO.	NO. OF PAGES
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B	TOOLS & PLANTS TO BE BROUGHT BY CONTRACTOR	APPENDIX-II A&B	2
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LEGEND:

ATTACHED AT THE END OF HARD COPY OF TENDER SPECIFICATION. ALSO HOSTED IN WEB PAGE AS PART OF NOTICE INVITING TENDER.

@: ISSUED AS A SEPARATE BOOKLET AS HARD COPY. ISSUED AS A SEPARATE DOWNLOADABLE SOFT COPY IN WEB PAGE.

NOTE: Bidders must Visit BHEL web site www.bhel.com for NIT, Qualifying Requirement of this work(QR), GCC etc. Further all corrigenda, addenda, amendments and clarifications to Tender Specifications will be hosted in this web page. Bidders shall keep themselves updated with all such amendments.

BHARAT HEAVY ELECTRICALS LIMITED

(A GOVERNMENT OF INDIA UNDERTAKING)
POWER SECTOR - WESTERN REGION
SHREEMOHINI COMPLEX
345-KINGSWAY, NAGPUR 440 001

TENDER SPECIFICATION DOCUMENT ISSUE DETAILS

TENDER SPECIFICATION No. BHE/PW/PUR/BHU-CLE/726

NAME OF THE WORK: Handling at Storage Yard/ Stores, Transportation to Site, Calibration, Erection, Testing, Commissioning, Final Painting and Handing over of Electrical and Control & Instrumentation Works of Co-Generation Plant comprising of HRSG(1X62TPH), 1 X Frame 6 Gas Turbine 1X33.3 MW, Steam Unit and their Auxiliaries, Piping etc. AT GUJARAT NARMADA VALLEY FERTILIZERS COMPANY LIMITED DISTT. BHARUCH (GUJARAT)

EARNEST MONEY DEPOSIT: Rs.2, 00, 000/ (RUPEES TWO LAKHS ONLY) . For more details refer Section-15 & GCC of this tender.

LAST DATE FOR TENDER SUBMISSION: Refer Notice Inviting Tender

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING **PART-I** AND **PART- II** ARE ISSUED TO:

M/s. ……

……

PLEASE NOTE:
TENDER SPECIFICATION DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

SENIOR MANAGER (PURCHASE)
Place: Nagpur
Date:

BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
POWER SECTOR - WESTERN REGION
345-KINGSWAY, NAGPUR 440 001

PROCEDURE FOR SUBMISSION OF SEALED TENDERS

The Bidder must submit their tenders as required in two parts in separate sealed covers prominently superscribed as part-I Technical Bid and part-II Price Bid and also indicating on each of the covers the tender specification number and due date and time as mentioned in the tender notice.

Part-I (Technical Bid) cover-I

Except rate schedule, all other schedules, data sheets and details called for in the specification shall be enclosed in part-I "Technical Bid" only.

Part-II (Price Bid) cover-II

All indications of price shall be given in this part-II "Price Bid".

These two separate covers-I and II (part-I and part-II) shall together be enclosed in a third envelope (cover-III) along with requisite EMD as indicated earlier and this sealed cover shall be superscribed and submitted to Sr. Manager (Purchase) at the above mentioned address before the due date as indicated.

The qualified Bidder will be intimated separately about the status of their offer.
Bidder are requested to make specific note of the following conditions:

Contractor should have adequate resources including major T & Ps at his disposal for this job.

Contractor should have sound financial stability.

Bidder should meet quality requirement regarding workmanship, deployment of personnel, erection tools and necessary inspection, measurement & testing instruments.

All information as called for in various appendices and clauses of tender specification should be furnished in completeness. Please refer the checklist.

Clarification if any on tender, shall be obtained by the Bidder before submitting their offer.

Offers must be submitted without any deviation.
Offers received with any deviation or without relevant information as described above are liable to be rejected. **Price bids received in the form other than specified in Part-II (Price Bid) are liable to be rejected.**

Bidder must sign & stamp all pages of this tender specification as an acceptance of tender conditions and must enclose this tender specification with their offer.
Bidder shall note that their offer will be considered subject to the approval of BHEL's customer.

Offer of bidder received after due date shall NOT be considered under any circumstances.

PROJECT INFORMATION

INTRODUCTION

1X33.3MW Cogeneration Power & Steam Unit is being set up by Gujarat Narmada Valley Fertilizers Company Limited, Bharuch District in the state of Gujarat.

The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given herein under is for general guidance and shall not be contractually binding on BHEL/Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

APPROACH TO SITE

Location:

Project site is located near Chavaj village in Bharuch Dist. Of Gujarat State & it is at a distance of about 4 kms from Bharuch on the NH-8.

Access by Road:

The project site is connected by national highway No. 8

Nearest Railway Station:

The nearest railway station is Bharuch 4kms from site.

Nearest Airport:

The nearest airport is Vadodara 80 kms.

1. Owner :Gujarat Narmada Valley Fertilizers Company Limited
2. Project Title :1X33.3MW CPSU Bharuch
3. Location :Bharuch, Gujarat
4. Nearest Railway Stn. : Bharuch, 4 Kms. From Site location
5. Temperature:
    a. Highest temperature 48 Deg.C
    b. Lowest temperature 5 Deg.C
6. Rainfall:
    a. Annual Average - 1000 mm in the period June to October.
7. Wind Data:
    a. 44 m/sec (annual mean speed)
8. Seismic Zone - Zone III as per IS: 1893-2005 (Part – IV)

THE BIDDER IS ADVISED TO VISIT AND EXAMINE THE SITE OF WORKS AND ITS SURROUNDINGS AND OBTAIN FOR HIMSELF ON HIS OWN RESPONSIBILITY ALL INFORMATION THAT MAY BE NECESSARY FOR PREPARING THE BID AND ENTERING INTO THE CONTRACT. ALL COSTS FOR AND ASSOCIATED WITH SITE VISITS SHALL BE BORNE BY THE BIDDER.

Check List (Vide Para 1.3 Of Section-I of General Conditions Of Contract)				
1	Name of the Bidder with Postal Address for Correspondence			
2	Name of Contact Person with Telephone & Fax No.	Mr./Ms Tel No. Fax No.		
3	Nature of the firm	PROPRIETARY / PARTNERSHIP / LIMITED CO.		
4	Details of EMD Please Indicate whether 1) One Time EMD or, 2) Only for this Tender	DD No. ……. DD Date……. Name of Bank……... Amount: Rs…….		
5	Validity of Offer (BHEL's Requirement: 180 days from Due Date)	Validity _____ days		
6	Mobilization Time (Please refer Section-11 of SCC)	Mobilization Time _____		
7	Whether any conditions stipulated?	**Yes** (vide Document reference:	**No**	
		Bidder to note that tender with conditions unacceptable to BHEL shall be rejected.		
8	Bidder has visited the project site and acquainted with the site conditions		Yes	No
9	Details of concurrent jobs are furnished (**Appendix- VI)**		Yes	No
10	Headquarters organization is furnished		Yes	No
11	Proposed site organization is furnished		Yes	No
12	Names and particulars of directors/partners are furnished		Yes	No
13	Financial status of the firm (**Annexure 'A' of GCC**) is furnished		Yes	No

Check List (Vide Para 1.3 Of Section-I of General Conditions Of Contract)			
14	**Copy of Audited Profit & Loss Account** for preceding three years duly authenticated on each copy by bidders Chartered Accountants	Yes	No
15	**Latest Certificate by Bidder's Banker for Overdraft & BG Limits** is Furnished (Certificate shall not be older than six months from the Last Date for offer submission)	Yes	No
16	Latest copy of **IT Return** along with copy of **PAN Card** are Furnished	Yes	No
17	Month-wise **Manpower Deployment Plan** (**Appendix – IV**) is furnished	Yes	No
18	**Analysis of Unit Rates** quoted (**Appendix-IX**) is furnished	Yes	No
19	**Month-wise deployment plan for major T&P** (**Appendix-II**) is furnished	Yes	No
20	Whether all the pages of the Tender Specification documents are read, understood and signed	Yes	No
21	**Power of Attorney** enclosed in favor of person making offer	Yes	No
22	Bidder has familiarized himself with all Relevant Local Laws & Local Conditions	Yes	No
23	Safety Requirement of this work in a Running plant Premises has been understood.	Yes	No
24	Erection and Commissioning programme furnished	Yes	No
25	**List of Jobs completed** in last seven years is furnished (**Appendix-VII**)	Yes	No
26	Whether **copies of detailed Work Orders (with BOQ)** and **Completion Certificates** in support of above furnished	Yes	No
27	Whether contractor has left any job unfinished? If so, give reasons.	Yes	No
28	Whether any client has terminated the contractor's work before completion? If so, furnish reasons for the same	Yes	No
29	**BIDDER MUST FURNISH HERE THE FOLLOWING DETAIL FOR RELEASING EMD AND OTHER PAYMENTS DULY ENDORSED BY BANK (IE SIGN & STAMP BY BANK).** 1 Name of the Company---------- 2 Name of Bank---------- 3 Name of Bank Branch---------- 4 City/Place---------- 5 Account Number---------- 6 Account type---------- 7 IFSC code of the Bank Branch---------- 8 MICR Code of the Bank Branch----------	Yes	No

Note: strike off or tick **'yes'** or **'no'**, as applicable

BIDDERS MUST SUBMIT ALL NECESSARY DOCUMENTS AS BEING ASKED IN ABOVE CHECK LIST.

DECLARATION SHEET

I,……HEREBY CERTIFY THAT ALL THE INFORMATION AND DATA FURNISHED BY ME WITH REGARD TO THE TENDER SPECIFICATION NO.**BHE/PW/PUR/BHU-CLE/726** ARE TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE. I HAVE GONE THROUGH THE SPECIFICATIONS, CONDITIONS AND STIPULATIONS IN DETAIL AND AGREE TO COMPLY WITH THE REQUIREMENTS AND INTENT OF THE SPECIFICATION. I FURTHER CERTIFY THAT I AM DULY AUTHORIZED REPRESENTATIVE OF THE UNDER-MENTIONED TENDERER AND A VALID POWER OF ATTORNEY TO THIS EFFECT IS ALSO ENCLOSED.

AUTHORISED REPRESENTATIVE'S SIGNATURE WITH
NAME AND ADDRESS

DATE:

TENDERER'S NAME AND ADDRESS

CERTIFICATE OF NO DEVIATION

TENDER SPECIFICATION No. BHE/PW/PUR/BHU-CLE/699

I/WE, M/s .....

HEREBY CERTIFY THAT NOT WITHSTANDING ANY CONTRARY INDICATIONS / CONDITIONS ELSEWHERE IN OUR OFFER DOCUMENTS, I/WE HAVE NEITHER SET ANY TERMS AND CONDITIONS NOR THERE IS ANY DEVIATION TAKEN FROM THE CONDITIONS OF BHEL'S TENDER SPECIFICATIONS, EITHER TECHNICAL OR COMMERCIAL, AND I/WE AGREE TO ALL THE TERMS AND CONDITIONS MENTIONED IN BHEL'S TENDER SPECIFICATION WITH ASSOCIATED AMENDMENTS & CLARIFICATIONS.

SIGNATURE OF THE TENDERER

DATE:

SECTION-3

OFFER OF THE CONTRACTOR

To
SENIOR MANAGER (PURCHASE)
BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR - WESTERN REGION
SHREEMOHINI COMPLEX
345, KINGS WAY
NAGPUR 440 001

DEAR SIR,

I/WE HEREBY OFFER TO CARRY OUT THE WORK DETAILED IN TENDER SPECIFICATION NO. BHE/PW/PUR/BHU-CLE/726 ISSUED BY BHARAT HEAVY ELECTRICALS LIMITED, POWER SECTOR-WESTERN REGION, NAGPUR, IN ACCORDANCE WITH THE TERMS AND CONDITIONS THEREOF.

I/WE HAVE CAREFULLY PERUSED THE FOLLOWING DOCUMENTS CONNECTED WITH THE ABOVE WORK AND AGREE TO ABIDE BY THE SAME.

1. INSTRUCTIONS TO TENDERERS
2. GENERAL CONDITIONS OF CONTRACT
3. SPECIAL CONDITIONS OF CONTRACT
4. OTHER SECTIONS, APPENDICES, SCHEDULES AND DRAWINGS.

I/WE HAVE DEPOSITED / FORWARDED HEREWITH THE EARNEST MONEY DEPOSIT FOR A SUM OF RS.2,00,000/- (RUPEES TWO LAKHS ONLY) DETAILS OF EMD PAYMENT ARE FURNISHED IN THE CHECK LIST.

EMD SHALL BE REFUNDED SHOULD OUR OFFER NOT BE ACCEPTED /EMD **NEED NOT BE REFUNDED AND THE AMOUNT MAY BE TREATED AS "ONE TIME EMD" FOR ERECTION AND COMMISSIONING TENDERS OF BHEL –PSWR NAGPUR** SHOULD OUR OFFER BE ACCEPTED, I/WE FURNTHER AGREE TO DEPOSIT SECURITY DEPOSIT FOR THE WORK AS PROVIDED FOR IN THE TENDER SPECIFICATION WITHIN THE STIPULATED TIME AS MAY BE INDICATED BY BHEL, POWER SECTOR –WESTERN REGION , NAGPUR.

I/WE FURTHER AGREE TO EXECUTE ALL THE WORKS REFERRED TO IN THE SAID DOCUMENTS UPON THE TERMS AND CONDITIONS CONTAINED OR REFERRED TO THEREIN AND AS DETAILED IN THE APPENDICES ANNEXED THERETO.

PLACE: SIGNATURE OF TENDERER:
DATE : ADDRESS:

WITNESSES WITH THEIR ADDRESS

SIGNATURE	NAME	ADDRESS
1.		
2.		

SECTION – 4

SPECIAL CONDITIONS OF CONTRACT

4.0 SCOPE OF WORK:

4.0.1

The Scope of Work under These Specifications Covers the Complete Work of Handling of Storage Yard/Stores, Transporting to site, Calibration, Pre-Assembly, Erection, Pre-Commissioning Checks & Tests, & Commissioning and Handing over of Electrical and Control & Instrumentation of 1 X 33.3 MW, GTG based Co-generation and Steam plant unit having:

- 2 x Frame 6 Gas Turbine and its Auxiliaries
- 2x 62 TPH HRSG and It's Auxiliaries
- Piping
- Electrical items
- Instrumentation and Control items

The Scope of Work, in general, covers Electrical And C&I System of Gas Turbine, HRSG, Generator Transformers, LT Bus Duct, Auxiliary Systems Like Lube Oil and Jacking Oil System, Regenerative and Feed Cycle, EHTC and AVR and HRSG, Turbine & Generator Supervisory Controls, Electrical Systems Etc.

The Work Shall Conform to dimensions, Limits, and Tolerances specified in various Drawings/ Documents that will be provided during the Erection/ Commissioning including final Painting of all equipments included in this work.

The work under this scope being quite sophisticated and also quite extensive, for proper planning, monitoring, reporting, etc of ongoing works, the contractor shall establish his own computer(s) and printer(s) at his site office, along with suitable operator(s), consumables, etc.

The scope of work is further detailed in the specifications hereinafter.

4.0.2

The intent of specification is to provide erection services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient erection and commissioning of the plant shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

4.0.3

The terminal points decided by BHEL shall be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.

4.0.4

The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate with personnel of customer's, contractor's, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

4.0.5
Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL. The BHEL engineer depending upon the technical requirements, availability of materials and fronts will decide this. No claims for extra payment from the contractor will be entertained on the ground of deviation from the methods adopted in erection of similar sets elsewhere.

4.0.6
The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management. The contractor should ensure successful and timely completion of the work.

4.0.7
All necessary certificates and licenses, permits & clearances required to carry out this work are to be arranged by the contractor expeditiously at his cost.

4.0.8
All tools, tackles, fixtures, equipments, materials handling and transportation except those specifically to be provided by BHEL, manpower, supervisors/ engineers, consumables etc., required for this scope of work shall be provided by the contractor. These tools & plant, equipments, men & material shall remain at site throughout the duration of contract and extension thereof, if any. Diversion/removal of these shall be done only on the approval of BHEL. for further details refer sections-5, 6 & 7.

4.0.9
During the course of erection, testing and commissioning certain rework/ modification/ rectification/ repair/ fabrication etc., will be necessary on various accounts. Contractor shall carry out such rework/ modification/ rectification/ fabrication/ repair etc., promptly and expeditiously. The contractor shall maintain daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc.. Claim of contractor if any, for such works will be governed by clauses 13.1 to 13.8.

4.0.10
All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipments/ components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, fitting up etc., as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work.

4.0.11
The contractor shall take delivery of the components, equipments, chemicals, and lubricants etc from the BHEL stores/ storage yard. Complete and detailed account of these shall be submitted to the BHEL.

4.0.12
Contractor shall plan and transport equipments, components from storage to erection site so as to avoid material accumulation at site. Contractor shall stack materials neatly at site and his stores. Where necessary, materials at site may have to be shifted and re-stacked for various reasons as incidental to work.

4.1 WELDING, NON-DESTRUCTIVE TESTING ETC.

A) Installation of equipment involves good quality welding, NDE checks etc.

B)
1) Welding of high pressure joints shall be done by IBR certified high pressure welders who have been permitted by CIB of concerned state for deployment at site of work.

2) Welding of all attachments to pressure parts, piping shall be done only by the qualified and approved welders.

C) All the welders (structural and high pressure) shall be tested and approved by BHEL engineer before they are actually engaged on work though they may possess the IBR/Other certificate. BHEL reserves the right to reject any welder without assigning any reason.

D) The welded surface shall be cleaned of slag and painted with primer paint to prevent corrosion. For this paint will be supplied by the contractor.

E) Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications. Certain types of coated welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the coated welding electrodes have to be carried in portable ovens.

4.2 TESTING, PRE-COMMISSIONING, AND COMMISSIONING:

4.2.1
Testing, pre-commissioning, & commissioning will involve, though not limited to these: setting/adjusting, Testing, proving, trial runs, etc. of various equipments and systems installed. All the activities for commissioning of the set, as informed by BHEL from time to time shall be completed.

4.2.2
All the above tests should be repeated till all the equipments satisfy the requirement/ obligations of BHEL to their client and also the relevant statutory authorities.

4.2.3
The contractor shall immediately attend to defects noticed during tests, trial runs, pre-commissioning, commissioning such as loose components, undue noise or vibration, strain on connected equipment etc. Readjustment and realignment as called for shall be done as per BHEL's instructions. Claim, if any, for these works from the contractor shall be governed by clauses 13.1 to 13.8.

4.2.4
i) Contractor shall cut/open work, if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.

ii) Similarly, during the course of erection, if certain portion of equipment's erected by the contractor has to be undone for enabling other contractors/agencies of BHEL/customer to carry out their work, contractor shall carry out such jobs expeditiously and promptly and make good the job after completion of work by other contractor's/ agencies of BHEL/customer as per BHEL engineer's/agencies of BHEL/customers instructions. Claims, if any, in this regard shall be governed as per clauses 13.1 to 13.8.

iii) Certain instruments may have to be installed temporarily/ in temporary installations for specific requirements. Contractor shall install, after due calibration if required, such instruments for which payment shall be regulated as per respective item rates. Contractor shall remove these instruments and return to BHEL/Client's stores after the use. No separate payment will be made for removal and returning of such instruments.

4.2.5
The testing/calibration / commissioning activities shall start prior to synchronization of GTG sets. The contractor shall provide adequate manpower, including supervision, of required skill level in various area of work with necessary consumables, tools and tackles etc., as part of commissioning till handing over of the unit to BHEL's customer.

4.2.6
It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning and commissioning period alongwith or without BHEL engineers and hence considerable overtime payment is involved. The contractor's quoted rates shall be inclusive of all these factors. Also please refer 4.12.

4.2.7
The contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the contractor.

4.3 GENERAL RESPONSIBILITY OF THE CONTRACTOR

4.3.1 Preservation & protection of components

Contractor shall at all stages of work preserve equipments/materials in his custody, including those erected. Necessary preservation agents, except the primer & paint, for the above work shall be provided by BHEL.

4.3.2
The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

4.3.3
Contractor shall maintain good house keeping & collect all scraps/unused materials/packing etc periodically from various areas of work site, dispose the same at one place earmarked at site or shift the same to a place earmarked in BHEL / client's store. ***1% value of each RA bill will be earmarked against compliance of the above, to be released only on satisfactory collection and deposit of scrap as stated above. In case of failure of contractor to comply with this requirement, BHEL will make suitable arrangement at contractor's risk and cost. In such case, any expenditure over and above the withheld 1% amount will also be recovered suitably from the RA bills of vendor.***

4.3.4
The contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilization of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the contractor. Decision of BHEL on this will be final and binding on the contractor.

4.3.5 Wastage allowance

Contractor shall carefully plan the cutting schedule of each cable drum in consultation with BHEL site engineer such that wastages are minimised. Recovery will be made in case the wastages are exceeding the wastage allowances fixed in this contract.

The erection contractor shall make every effort to minimize wastage during erection work. In any case, the wastage shall not exceed the following limits;

Power Cables	**1.5%**
Control & Instrumentation Cables	**2.0%**
Fabrication steel	**2.0%**
Impulse pipe/tubes/GI pipes/copper tube	**1.0%**

If however, the bidder quotes for more wastage than specified above, the excess portion will be considered for adjustment during the tender evaluation at the quoted supply rate of material.

If the actual wastage be more than the specified figure, then equivalent price of the excess portion will be deducted from the contractor's bill.

Cable cut-pieces in lengths 10 m & above in both the above categories will be considered as useable and shall be taken in to account for computing net issued quantity when returned to BHEL stores/storage yard.

4.3.6
For any items or class of work not specified herein but required for total completion of work, the same shall be carried out as per BHEL requirement. However, payment of these items/class of work shall be regulated on the basis of rate arrived at by either of the following methods:

a) Based on rate of identical/similar items in the rate schedule.

b) Based on the rate arrived from nearby items in the rate schedule.

Wherever any item rate for similar type of work or nearby item rate does not exist in the rate schedule, rate will be worked out on the basis of work element or from fundamentals of estimation.

Contractor shall provide necessary resources for completion of such work within the stipulated time schedule. Value of such work shall be included while computing the total value of work finally executed for all contractual purposes, particularly for contract variation purpose.

4.4 FINAL PAINTING

4.4.1
The contractor shall provide all the primer, paint, and other consumables like brush, cleaning agents etc. All T&P, manpower, supervision is in contractor’s scope. Painting shall be carried out as per colour scheme approved by BHEL/ BHEL customer.

4.4.2
All the equipment including piping, supports, structures, etc., as applicable shall be painted after thoroughly cleaning the surface from dust, rust, grease, oils, scales, etc, by wire brush,

scrapping, etc as specified. The above parts shall then be painted with two coats of synthetic enamel paint over the shop primer/paint. Also, where the shop primer/paint has peeled off, the affected area shall be cleaned thoroughly by the specified method and then primed. Similarly, certain components may be supplied without any primer/paint coat from shop. The surface of such items shall be cleaned as per specifications, primed with suitable primer and then coated with final paint coats. The dry film thickness after final coat should be as per specification. The color, shade etc; shall be as per specification. Primer and paint shall be sourced only from the following manufacturers or any other manufacturers approved by BHEL.

1) Berger Paints (I) Ltd.
2) Asian Paints ltd.
3) Goodlass Nerolac Paint Ltd.
4) Jenson & Nicholson Ltd.
5) Shalimar paints Ltd.

In order to have consistency in painting system, it is preferable that all the supplies are sourced from one single manufacturer.

The primer shall be compatible with the final coat paint schedule.

All the fabricated frames, racks, supports, panel base frame etc. wherever applicable shall be painted primer and with two coats of paint as specified earlier herein.

Touch-up painting of switchgear panel, 415 Volt LT MCC, Control Panels or any other equipment /devices wherever necessary.

Full painting of transformers, bus ducts with two coats of paint as per specification.

Irrespective to scopes of painting & supply of paint mentioned elsewhere it is to be noted that supply of paint, primers, other consumables etc for all primer/painting works to be done by the contractor, shall be in Contractor's scope. No dispute shall be entertained on the above matter.

4.4.2.1 TRANSFORMERS & BUS DUCTS

Transformers and Bus Ducts erected by the contractor shall be painted with two coats of Finish Paint after thoroughly cleaning the surface from dust, rust, greases, oils, scales, by wire brush, scrapping, machine buffing, water washing and any other appropriate method as specified in relevant erection documents. Bus Ducts shall first be coated with two coats of Primer before application of Finish Paint.

Colour Banding, Legend and Identification Marking, Direction Marking etc. shall be in scope of the contractor.

4.4.2.2 STRUCTURALS

Structural components may be supplied without any primer/paint coat from shop. The surface of such items shall be cleaned as per specifications and then coated with two coats of Primer.

4.4.2.3 PANELS, JUNCTION BOXES

Panels and Junction Boxes shall be Touch-up painted as and where original shop paint is peeled off. Necessary surface cleaning and preparation shall be done by the contractor as per relevant painting codes followed by two coats of Primer and two coats of Finish Paint.

4.4.2.4 Primers, Paints etc.

The contractor shall provide the Primer (ROZC as per IS:2074) for the scope of painting work indicated in Section-4 as well as for protection of site weld joints and gas cut locations. Contractor shall also arrange to provide the required thinner and other consumables, T&P etc required for application of ROZC Primer. All paints and thinners shall be sourced only from BHEL approved manufacturers.

4.4.3
In addition, color banding, legend and identification marking; direction of flow/rotation marking etc. is part of the work.

4.4.4
Contractor shall ensure that all steel structure used for electrical installation shall be painted with one coat of Red Oxide Zinc Chromate primer and two coats of Aluminium Alkyd paints of approved shade for indoor installations. However for outdoor installations and corrosive areas like Battery room / DM plant etc, contractors shall carry out hot dip Galvanisation.

4.5 The contractor's scope of work is further described in the clauses hereafter:

The work will comprise of, *but not limited to the following:*

Power Transformers

1). Generator Transformer, Station transformer and Auxiliary transformers:

Transformer tank will be supplied filled with oil upto the core end winding level or gas filled. Accessories like radiators, conservator tank, pipes, fittings, hardware, gaskets, BUCHHOLZ relay, Marshalling box, relief vent, valves, pumps, cooling fans, cabling between marshalling box, bushings, radiator headers/fans, LT/HT cable box, rollers, tap changer, electrical control unit, bushing turrets and oil in 200 Ltrs. Barrels shall be supplied loose. The erection and testing of transformer shall include the following work and activity: -

4.5.1.1 Generator Transformer, Station Transformer and Unit Auxiliary Transformers main assembly(transformer tanks) shall be made available to the contractor about **100** meters away from the respective foundation, further transport and shifting to the foundation shall be in the scope of this work. The shifting operation may require dragging, fixing of wheels, rollers and turning of transformer to a suitable location enroute to suit the layout. The contractor shall arrange wooden sleepers, winches, jacks, rails and crane etc at his cost for this operation. However accessories shall have to be shifted from stores.

4.5. 1.2 The transformer should be handled in such a manner so that no jerk is transferred to the core and winding and internals of the transformer.

4.5. 1.3 Contractor has to transport the various transformers, transformer tanks & accessories of transformers other than GT, ST and UATs from BHEL stores/ Storage yard to respective foundations.

4.5. 1.4 Placement on plinth, alignment with respect to the foundation and lay out drawings.

4.5. 1.5 Internal inspection to verify the intactness of core end winding, tape changer leads, off-load switch, measurement of core and core bolt insulation.

4.5. 1.6 After internal inspection, the transformer shall be kept under vacuum for a period to be decided by BHEL engineer, after which pre-treated oil is to be filled up to required level.

4.5. 1.7 Each drums of oil is to be tested for BDV and if BDV is less, then each drum should be filtered separately.

4.5. 1.8 Contractor has to arrange storage tank of 10-Kiloliter capacity with internal surface sand blasted and painted with minimum one coat of oil resistant paint. Oil from drums is to be transferred to the storage tank and filtration to be carried out to achieve the required BDV value. This treated oil is to be filled in the transformers and auxiliaries. However, for low capacity transformer, a separate storage tank for mass filtration is not required.

4.5. 1.9 All the accessories shall be assembled/mounted as per OGA drawings and these should be thoroughly cleaned prior to installation.

4.5. 1.10 Drying out of transformer and filtration of oil in cooling bank, pipe line, diverter tank of tap changer etc. To be done with ultra vacuum filtering machine of adequate capacity. Drying out process shall be carried out round-the-clock and contractor shall deploy trained manpower for this purpose.

4.5. 1.11 During dry out process, contractor has to plot the curve for insulation resistance value/time/oil temperature. Hourly reading to be recorded till completion of the dry out.

4.5. 1.12 The criteria for deciding completion of drying out shall be breakdown value of oil, ppm value of oil, resistivity of oil, transformer winding, insulation resistance value of winding and polarization index.

4.5. 1.13 The filter machine capacity if found to be inadequate, or in case of failure of existing machine, an alternative arrangement shall be done to meet the required result and time schedule.

4.5. 1.14 Due to unforeseen reasons the commissioning of transformer is delayed after first drying out and if required, the contractor shall carry out the oil filtration of assembled transformer. For full refiltration, payment will be made at 25 % of quoted price of Transformer.

4.5. 1.15 Contractor shall arrange required testing equipments for carrying out electrical test like voltage ratio, turn ratio, vector group, magnetic balance, winding resistance measurements, BDV value of oil, tan delta measurement of bushings & winding, insulation resistance, measurement of oil PPM and resistivity. The contractor shall arrange for testing of oil samples for PPM/ Resistivity etc. At BHEL approved testing laboratory at his own cost.

4.5. 1.16 The contractor shall arrange for attending to the leakage noticed at any stage till handing over of the unit. Gasket/ packing blanks will be provided by BHEL, which, if required, shall be cut to, required profile and size.

2). Auxiliaries power transformer

4.5.2 Transformer tanks shall be supplied filled with oil upto the core and winding level or gas filled. Accessories like radiators, conservator tank, pipes, fittings, hardware, gaskets, BUCHHOLZ relay, marshalling box, relief vent, valves, cabling between marshalling box, bushings, LT/HT cable box, rollers, electrical control unit, and oil for topping-up in 200 Ltrs. Barrels shall be supplied loose. The erection and testing requirements as specified for "generator transformer" shall be applicable except vacuum pulling.

4.6.1 **Installation of panels and HT/LT Switchgear**

A. Electrical control panels, Electronic Control panels, Unit Supervisory Control DESK, HT/LT Switchgear, 415 Volt LT MCCS, Analyser Panels and Transmitter racks/enclosure are normally supplied in suit of either one/two/three or loose shipping sections with integral base frame or loose base frame. These panels may have to be installed as stand-alone or in-group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.

B. The panels shall be transported from stores to the place of installation in vertical position. Care shall be taken such that the Switches, Lamps, Instruments etc. mounted on the panel does not get damaged during transit.

C. Installation of panel shall include fixing of base frame, leveling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubicle interconnection hardware's, Bus bar jointing, wiring interconnection, Welding and Grouting of panels and base frames, mounting of panel Canopy wherever supplied as part of panel, drilling of gland plates, sealing of panels/ cable entries. Where the base frame is not supplied as part of panel supply, the contractor shall fabricate the base frame from structural items at site. Payment for such fabrication will be effected on measured quantity at the rate applicable for structural steel fabrication and installation. Special material required for fireproof sealing of the panels shall be supplied by the contractor within the quoted rates. Proper sealing of all the holes and Cable entries (even if the cable has been laid by others) in the panel is in the contractor's scope.

D. Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. which shall be a part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc. Panels have to be erected at different locations and elevation in HRSG, SGTG Hall, LT & HT Switchgear room, Unit Control Room etc.

E. Panel and instruments once erected in position should be properly protected using necessary care to prevent ingress of dust/moisture. This will have to be periodically cleaned and surroundings have to be kept tidy.

F. Whenever the panels to be mounted on cable trenches, channel supports have to be provided across the cable trench over which the base frame of panel shall be mounted. For such work, Structural Steel fabrication & installation rate shall be applicable.

G. Normally the panels shall be supplied with meters, relays, electronic modules, contractors, pushbuttons etc mounted and pre-wired. However, if such devices are supplied loose/separately for safety in transit, contractor shall mount the same, as part of panel installation work and no extra payment shall be made for this.

H. Supplier's instruction manuals, packing slips, door keys etc. Received along with the panels will be handed over to BHEL's engineer on opening of the panels.

I. Regular cleaning of the panels as per the instruction of BHEL engineer till handing over of the set to customer is to be carried out by the contractor free of cost.

J. 24 / 48 Volt DC Interposing Relay along with mounting base shall be supplied separately for mounting in the various feeders of 6.6 KV HT switchgear boards and 415 Volt MCC Board / Switchgear Panel Boards for uni-directional / bi-directional drives, solenoid valves. 2 Nos. interposing relay may be required to be mounted in each feeder. Internal wiring for these relay shall be pre-wired in the feeders, wires to be terminated on relay terminals. Contractor shall mount the same and terminate the wire as part of panel installation work and no extra payment shall be made for this work.

4.7 415V MOTOR CONTROL CENTERS (MCC) & DC/AC DISTRIBUTION BOARDS

4.7.1

Motor control centres are double front draw –out/non-draw type consisting of circuit breakers units, contractor/starter, switch fuse units, MCC, Protection & metering relays/ instruments etc. arranged in multi tier construction. These PCC and MCC are mainly supplied to cater to the requirements of drives, valve actuators etc.

4.7.2

DC distribution Boards is single front non-draw out type consisting of circuit breakers, contactors, starters, fuse units, MCB etc arranged in multi-tier construction. Shall be located in LT switchgear room to cater the dc supply requirement.

4.7.3

The scope of work for the LT switch board and DCDB covers receipt of materials from stores, transportation to the respective location, erection, testing, commissioning and handing over.

4.7.4

Rubber mats shall be supplied by BHEL for HT/LT switchgear and the same shall be laid wherever required as part of work.

4.7.5 415 VOLT LT SWITCHGEAR / MCC & DC DISTRIBUTION BOARD ETC

1. Checking of installation for correctness.
2. Mechanical functional checking/ adjustment of individual breaker.
3. Measurement of Insulation resistance of individual breaker, complete switchgear board and combined insulation resistance of individual breaker with cable connected to drives.
4. Testing of Protection Relay, Thermal over relay, Power transducers, Energy/ Ammeters, Voltmeters, Power factor, frequency, tri-vector meters & metering etc. in static & dynamic condition relay
5. Conducting test such as Insulation Resistance measurement, Ratio, polarity, magnetisation characteristic, winding resistance on CT and PT.
6. Checking of electrical control & protection interlock of individual breaker and integration with other system.
7. Calibration of energy meters, tri-vector meters, voltmeters, ammeters, power current & voltage transducers etc.

8. Provide assistance for checking the electrical operation of individual breakers from remote panels / MMI package(maxDNA system).

4.8 Cable Laying (Power / Control / Instrumentation shielded cables / Triad Cable / plug-in cables / UTP cables for Ethernet / armored / Un-Armored, single / multi-core, PVC/HR PVC / FRLS / Teflon / XLP insulation)

A. Cable laying (erection) will include:

1. Cutting to the required length, laying in overhead/underground cable trench/ through pipes/flexible conduits. Cable rollers have to be used as per requirement. The contractor shall prepare the drum schedule in order to minimize the wastage.

2. Dressing/Clamping in tray etc.

3. Drilling of holes in gland plates in panels and junction boxes for the entry of cable.
4. Cable glanding, splicing, dressing of spliced wire inside the panel and JBs
5. Providing printed ferrules. Wherever required ferrules shall be one-piece heat shrinkable type. **Contractor has to arrange for suitable ferrule printing machine(s).**
6. Termination by using crimp type lugs copper tinned/ aluminium (insulated/ un-insulated).
7. Providing identification cable tags, aluminium at both the ends and at appropriate interval (30m) throughout the route length. Tags to be arranged by the contractor.
8. Continuity checking, insulation resistance checking, High Voltage test on HT cables, as applicable.
9. HT and LT Power cable trefoil clamps (Die cast Aluminium of good quality) are to be arranged by the contractor within the quoted rates.

B. Entry to the panels, JB may be from top, side or bottom. All cable shall be supported and clamped near the panels/JBs.

C. Wherever cable glanding is not possible, either due to the gland plate size limitations or more number of cable entries, suitable alternative arrangement as specified by BHEL/consultant shall be done. Pre-Fab plug-in cables, for such cases, cables may have to be lifted inside the panel either making cut-out in gland plate and providing Rubber profile for sharp edge protection or alternatively, provide 4/6" PVC pipe coupling gland and these pipe coupling gland shall be supplied by contractor within the quoted rate of cable laying.

D. Copper Tinned lugs of various type (pin, ring, fork, snap-on), PVC cable ties, PVC ferrules (printed), PVC buttons and tapes, cable identification tag of metallic, clamping and dressing material with hardware, PVC sleeves etc. Shall be supplied by the contractor within the quoted rate for cable laying. The quality of material shall be got approved from BHEL engineer prior to their procurement.

E. All care should be taken to avoid abrasion, tension, twisting, kinking, stretching of cables during installation.

F. Cable shielding – all signal cables are supplied with bare shielded copper wire/with braided wire shield, generally shield wire is kept isolated at instrument/field device end and continuity is maintained through JBs and getting earth at panel end only. While terminating the shield wire either in panel or JBs, PVC Sleeves is to be used to avoid two-point Earthing. Supply of PVC sleeves of appropriate colour is in contractor's scope.

G. Wherever cable ducts/tray, conduits pass through fire barriers such as walls, floors etc., the openings/ passage shall be sealed using fireproof/ weatherproof sealing compound. Similarly cable entry in panels, MCC/HT/LT Breakers, Instruments, Electrical Actuators etc are also required to be sealed. These shall be done as per the specifications of BHEL. Required consumable shall be in contractor scope of supply within quoted rate for cabling.

H. Normally, cables glands on junction boxes side are received mounted. While terminating the cables as per drawings, the cable glands to be removed and fixed. Wherever cable glands are not received alongwith junction boxes, no separate payment will be made for fixing the cable glands to the junction boxes including drilling of holes.

I. For single core HT power cable BHEL will provide the trefoil clamps.

J. Many of the cables may have to be laid in the cable trenches. For this purpose, the cover of trenches has to be opened for working inside. All safety precautions have to be observed while laying the cables in the trench. After completing the work, the trench has to be cleaned and covers put back into position. The contractor, if required, shall do de-watering of trenches.

K. Underground cabling of about 500 meters for road / flood lighting fixtures on swaged pole will be necessary. Following works involved over & above normal cable laying works shall be included within the scope

- Excavation of earth 300 mm width & 600 mm depth
- Sand bedding around the cable 100 mm to 150 mm (including supply of sand.
- Keeping protection bricks through out the cable length (including supply of bricks).
- Back filling.

L. Terminations:

The types of cable terminations are as detailed below:
1) Power cable: Crimping hydraulic / Manual
2) Control cable: Manual crimping
3) Crimped/soldered plug-in-type Screwed type.
All console devices / computer peripherals shall be screwed, crimped, soldered plug in type.

UTP cable with RJ 45 connector.

The contractor shall arrange for special tools and skilled manpower required for any type of cable termination (like fiber optic jointing kit and RJ45 crimping tool etc) as mentioned above.

Additionally ferrule printing machine(s) for printing of sleeved ferrules of various sizes will also be arranged by the Contractor, as mentioned above under 4.5.7, A 05.

M. Looping wire at terminal block of panels and electrical actuator as shown in the inter-connection diagram is to be done by contractor at no extra cost.

4.9 CABLE TRAYS/CABLE DUCTS

A. Various types of sheet metal, Galvanised Cable Tray, i.e. Perforated, Ladder type, sheet metal duct, solid bottom trays, pre-fabricated structural trays etc., will be supplied in standard lengths alongwith accessories and hardware viz coupler plate, tray covers and tray clamps etc.

B. Installation of cable tray/cable duct shall include cutting, laying, jointing, fixing tee/reducers/ bends/clamps, fixing of tray covers, hardware, welding of tray supports as per tray route layout etc.

C. Fabrication of bends/tee/ reducers from straight length is within the scope of work and rate quoted shall be inclusive of this. All site welds of cable trays shall be painted with approved primer and cold galvanizing paint, which shall be arranged by the contractor.

D. In case, structural cable trays, bends, tees, reducers etc., are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.

E. Cable trays/duct etc may have to be routed underground in cable trench, overhead on structure, along the walls, floors etc. for various applications.

4.10 STRUCTURAL STEEL FABRICATION AND INSTALLATION

A. Structural steel material like MS angles, channels, beams, flats, plates etc. Shall be supplied in running meter and the same shall be used for fabrication of panel base frame, cable tray supports, Canopies for instruments/panels/ drives/JB's/Push Buttons etc., Instrument/Junction box frames, Impulse Pipe/Instrument Air Pipe supports and instruments etc.

B. This shall include cutting to size, contouring of ends for connections if required, Welding, Grinding of excess weld deposits/burrs, drilling of holes for mounting of device/instrument, installation at location, leveling, alignment, providing bracings and painting etc. No gas cut holes will be permitted.

C. All the fabricated supports/frames for instruments, trays, pipes, electrical equipments, etc., shall be epoxy painted after sand blasting and surface preparation as per painting specifications. Paints and other associated items are in the scope of the contractor.

D. Frame installation at site may involve mounting either on concrete floor by grouting/using anchor fasteners or on steel structure by welding etc. All consumables including anchor fasteners shall be arranged by the contractor. Where required, as part of work, concrete floors may have to be chipped out to reinforcement depth for anchoring the frames. Wherever grouting is required, contractor shall arrange all the required material including cement/grout mix, shuttering, labour etc., and meet all other requirements as part of work.

E. In certain packages, members of frames/rack for mounting of junction boxes/ instruments may be supplied readymade. These have to be assembled prior to installation. The installation rate as quoted shall include assembly of the frames.

F. Gas cutting of tray/impulse pipe support and holes in frame is not permitted. Only hacksaw cutting/ drilled hole shall be permitted.

4.11 LAYING OF PIPES/TUBES (IMPULSE PIPE)

A. Installation of impulse pipe of CS/AS/SS material shall include cleaning, air flushing, cutting to length from the running meter, edge preparation, cold bending, welding of sockets/ reducers/ tee/ cross/ isolating valves/union nut and nipples/tail pieces etc., mounting of SS/CS three/five valve manifolds and compression fittings, condensate pot/equalizing vessel, providing supports, clamping, conducting leak test/hydraulic pressure test, painting and other

accessories as per instrument hook-up diagram. Piping works shall involve either arc or TIG welding.

IBR certified welders shall be deployed for welding of impulse pipe and contractor shall take approval for welder and welding consumables from BHEL site engineer.

B. All fittings and accessories for impulse pipe and air line shall be provided by BHEL. Quoted rate for piping shall include cost of installation of such fittings as no separate rate is envisaged.

C. Contractor shall provide GI clamps for impulse pipe and GI pipes within the quoted rates for installation of the same.

4.12 INSTRUMENT & SERVICE AIR PIPING (SS/GI PIPE)

Laying of pipe (SS/GI) for instrument air line shall include air blowing, cutting from the running meter length, threading, installation of Elbows/ Tee/Reducer/ Moisture traps/Auto drain pot/check valves/isolating valves, supporting clamping, conducting leak test etc. Threaded joints of air pipeline shall be made leak proof by using Teflon tapes or sealing compound. Seal welding of threaded joints may be called for if required. This shall be done within the quoted rate.

4.13 COPPER TUBING/PIPE/SS TUBE

Installation of Copper Tube/SS Tube/Copper pipe shall include cutting into required length, laying, bending, cleaning, brazing wherever required, fixing of fittings like compression Fittings/Tees/End connectors/straight connectors/bulk heads/valves etc. Supporting, clamping including supply of clamps and hardware, flushing and conducting leak test. Suitable tube cutters, benders and deburring tools will be used for such jobs.

4.14 Earthing installations

4.14.1

All equipments shall be earthed by two separate and distinct connections. Earthing terminals will be available in all equipment supplied by BHEL.

4.14.2

The earthing conductors shall be of mild steel/GI strip/ wires. All connections from equipment to main earthing conductors shall be made as illustrated in earthing drawing / as per instruction of BHEL engineer.

4.14.3

A continuous earthing conductor shall be installed in all cable trays and securely clamped to each tray section by suitable connectors to form a continuous earthing system. When two or more trays supporting power cables run in parallel, a continuous earthing conductor shall be provided on trays only with tap offs to the control cable trays. All valve and damper motors and rapping motors will be earthed to this conductor.

4.14.4

All joints in the earthing system shall be welded type. Earthing connections to all equipments including motors shall be bolted type.

4.14.5

Earthing connections shall be free from tinning scale paint, enamel, grease, rust or dirt at the time of making joint.

4.14.6

Metallic sheaths, screens/shields and armour of all multicore cables shall be bonded and earthed.

4.14.7

Earthing conductors along their run on columns, beams, walls etc. shall be supported by suitable cleats at intervals of 750 mm.

4.14.8

Welded joints on GI earthing conductors shall be coated with one coat of bituminous paint in case of buried earth grid or earth flats to be laid in cable trench. For site welded GI strips/wires which are exposed these are required to be painted with one coat of cold galvanising zinc paint. Contractor to arrange the required paints and other items at his cost.

4.15 Mark VI panels, MAX control panels, Man-Machine-Interface

GT, HRSG, Station C&I / Balance of plant and electrical control system panels are based on digital distribution control philosophy. Max system is having Ethernet Communication to various panels (RPU), MAX Storian, MAX Link and MAX Stations and its peripherals like printer etc. MAX System comprises of event monitoring, video process control, alarm management, calculation and logging, comprehensive history, reports, statistics, file archiving. The various components / devices are located in control room / panel room and shift in charge room. The entire work of erection, testing, commissioning of the connected devices / equipments as listed in rate schedule is to be carried out including laying of peripherals cables (either plug-in or plugs to be fabricated at site), placement of computer furniture in computer room as per lay out. The computer furniture shall be supplied either assembled or in knocked down condition, which have to be assembled at site. The quoted rate shall be inclusive of cable laying, termination and assembling / placement of furniture against each devices as given in the rate schedule. Loose devices like recorders, indicators, and monitors are supplied loose.

4.16.0 Control panels

TG, Station C&I and HRHG system panels are based on Max DNA distributed digital control philosophy. Max DNA system is having communication through UTP cables amongst themselves. The system consists of computer network with servers and workstations and various peripherals like printers, etc. Optical fibre cables are also used for communication, especially for larger distances. The various components/devices are generally located in control room/computer room/diagnostic and shift in charge room. Some panels (viz. network panels) are also located in outdoor plants and other units.

The entire work of erection, testing, commissioning of the connected devices/equipments as listed in rate schedule is to be carried out including laying of peripherals cables (either plug-in or plugs to be fabricated at site), placement of computer furniture in computer room as per lay out. The computer furniture shall be supplied either assembled or in knocked down condition, which have to be assembled at site. The quoted rate shall be inclusive of cable laying, termination and placement of furniture against each device as given in the rate schedule.

4.17.0 Vibration monitoring system for TG/BOP auxiliaries

System comprises of transducers with integral cables, weldable pads, wall mounted cabinet including monitors. The pads required to be welded on SS block on HT motors end shield and fan bearing housing. In case of pad sizes more than the SS block provided on motor, contractor shall get the pads machined as per the required size and blue matching to be carried out before welding on bearing housing. No extra charges will be applicable.

4.18.1 Steam and water analyser system

The system consists of the following in general:

Wet system panel consisting of 2 nos. of Primary sample coolers (Approx dim. 2000x1800x600 mm, 2000x600x600 mm), Secondary coolers(appox. Dim. 1800x3040x1340 mm), Wet panel (approx. dim. 4600x2100x600 mm, 600 kgs.), Dry panel (Approx. dim. 5000x2300x750 mm) tubing and fittings for individual stream of steam and water lines and associated devices assembled together and housed in sheet metal enclosure. Process sample line of SS material to be terminated at panel end with bulk head connection. Sample lines will be socket welded type. Ph sensors, conductivity analyzer , chloride analyzer , sodium analyzers, silica analyzer, multi channel, DO2 analyzer, hydrazine analyzer and sensors for these analyzers will be supplied loose with integral / prefab cables, to be mounted and wired up in relevant panels.

Recorder panel may be supplied separately where the recorders (supplied as loose items) will have to be mounted and wired up.

In wet analyser panel, Phosphate, chlorine, silica, hydrazine, chloride, etc analysers along with accessories will be supplied loose for mounting, wiring and tubing at site.

Chiller Unit, auxiliary cooling water, etc would be supplied as package with accessories like SS/CS pipes, chilled water circulating pump, chilled water storage tanks, valves and fittings.

Commissioning of the analysers is a part of analyser panel commissioning (both wet and dry).No extra payment will be made for installation of the analysers in the panels and wiring of the same.

Commissioning support will be provided by vendor.

4.18.2 Flue gas analysers

4.18.2.1 Oxygen Analysers

The system consists of Zirconia probes, electronic units Panel for mounting electronic unit, purging and calibration gas arrangements, etc. The probes are meant for direct mounting on duct / chimney, etc., at suitable elevation.

Commissioning support will be provided by vendor.

4.18.2.2 NOX, SOX, CO analysers

NOX, SOX, CO analysers system consist of extraction type sampling probes and shall be mounted on the chimney at a considerable height. This will also consist of other accessories

like gas extraction sampling pumps, sampling tubing, electrical heat tracer, insulation, test gas cylinders, purge air compressors, etc, etc.

Commissioning support will be provided by vendor.

4.19 Field instrumentation

1. Various type of primary/secondary/ indicating/ recording instrument for pressure, temperature, flow, level, speed, turbo-supervisory and analytical measurement shall be supplied either loose or mounted alongwith the equipment.

2. Scope of work under calibration, erection// testing/ commissioning shall include calibration, setting, adjustment, supply and fixing of instrument tag plates as specified by BHEL, report making, installation, servicing, minor repairs, putting instrument into service, signal checking from field upto the functional group panels and remote indicating/recording instrument, functional checks, interlock and protection/alarm checks by simulating the field devices, trouble shooting during pre-commissioning/ commissioning and till the unit is handed over to the customer.

3. Contractor shall establish calibration laboratory with adequate facilities and they should arrange standard test instruments duly calibrated from the agencies approved by BHEL. Calibration report of the same should be submitted prior to start of calibration of the field instruments/devices.

4. It is the responsibility of contractor to make erection, calibration/ testing and commissioning protocols for various equipments/devices installed by them and they should get duly certified by customer/BHEL engineer and should be submitted to BHEL engineer regularly. However, sample formats will be given by BHEL and have to be printed by contractor in adequate numbers.

5. Installation of instrument shall also include drilling of holes and tapping for mounting of instrument and local instrument frames/panels and supply of hardware for mounting of the instrument.

6. Some devices line solenoid valves, position feedback transmitters, limit switches, air filter regulators, airlock relays, positioners etc., are supplied assembled along with mechanical equipments like pneumatic control valves, power cylinders, trip valves, dampers, motorised actuators, etc. These will need removal, calibration/testing, refixing, adjustment, etc., and commissioning. Separate payment shall not be made for this. The rates quoted for the commissioning of these equipments (viz., pneumatic control valves, power cylinders, trip valves, dampers, etc.) should take care of the above. Also, the contractor shall remove such devices prior to erection either at site or at store to avoid damages/pilferages and keeping in safe custody and the same shall be installed prior to commissioning of such equipment.

7. Transmitter enclosure / open racks for various packages which are to be erected and commissioned at various locations of the Boiler, turbine and outdoors, shall be supplied with internal tubing, air filter regulators, rotameters, provision of continuous or intermittent purging arrangements wherever required, etc. The quoted rates for these racks / enclosures shall include the erection and commissioning of all such items inside these racks / enclosures.

8. Sometimes recalibration of equipments may become necessary due to reasons not attributable to the contractor, e.g. Lapse of Time after first calibration, Need for change in range/parameter, etc. If re-calibration is required due to no fault of the contractor, the rates payable for re-calibration shall be as under:

Recalibration Charges = 60% of the Percentage Stage Payment for Calibration as per split-up defined in Terms of Payment (Section-12)
The contractor shall keep record of such instrument with the reason for re-calibration and certified by the BHEL Engineer.

Note: For recalibration of skid mounted items or other systems where lumpsum rates are quoted, the recalibration charges, if admissible, will be calculated from the relevant unit rates quoted for same / similar items elsewhere in the rate schedule. The decision of BHEL Engineer shall be final and binding on the contractor.

9. For the very few cases where required, the contractor shall carry out re-orientation of bottom/top entry arrangement for process connection if needed due to site condition in existing instrument rack/enclosure/JB and re-location of existing instrument including removing of the existing tubing and re-installation of the same at appropriate location due to any change in grouping of the instrument and no extra payment shall be applicable.

10. In certain cases instruments / devices are supplied on equipment or drawn by other agencies as part of mechanical package. The same are to be received or to be collected from other agencies for keeping in safe custody to avoid damages. The same are to be erected back after calibration for which unit rate shall be applicable for erection and calibration. Contractor shall maintain record of such instrument duly certified by BHEL engineer. However for removal of such instrument, no separate rate/payment shall be applicable.

11. For such of those instruments/devices such as temperature gauge/switches, pressure gauge/switches, transmitter pressure/flow/ level/DP, level probe/switch etc, which are received, assembled with mechanical equipments and are to be calibrated, only calibration rate will be paid as per applicable rate for respective instruments/devices. No payments shall be made for removal and re-fixing of such instruments.

12. Wherever thermowells are supplied along with temperature gauges, thermocouples, temperature switches, thermostats, etc., the contractor has to co-ordinate with the mechanical contractor for identification and fixing of thermowells on the pipeline. However actual fixing of thermowells on pipeline and seal welding shall be done by mechanical contractor and is not a part of instrument installation.

4.20 INTEGRATED TESTING OF CONTROLS AND PROTECTIONS & RELAY TESTING

Integrated testing of control and protection of generator, generator transformer, unit aux. Transformer, bus duct, station transformer and HT breaker

Integrated electrical testing/commissioning of generator control and protection relay panels, LT MCC, HT Breakers, other electrical panels and associated equipment shall involve various activities like relay testing/setting, simulation checks, testing of energy meters, on/off line functional checks on integrated system.
The brief scope of work under the "integrated testing/ commissioning of generator controls and protections relay panel & associated equipments" is defined as below, but not limited to the following.

1. Relay testing in static condition for generator, transformers, and associated system by secondary current injection at different current and recording the time duration.

2. Testing and checking of control and protection interlock scheme in static condition and simulation of protection device contact from internal and external devices.

3. Measurement of Insulations, Winding Resistance, Polarization Index of winding of Generator & associated equipment/ system, DC resistance test & Impedance test on rotor, Brushless excitation system at the time of rotor insertion as well as during pre-commissioning stage / commissioning stage/ post commissioning stage.

4. Relay setting and checking the stability of protection relays in static and dynamic condition during the OCC (open circuit characteristic) & SCC (short circuit characteristic)

5. Functional checks / testing of synchronizing schemes during the static and dynamic by simulation / back charging of generator transformer conditions.

6. Monitoring & recording the various parameters during open circuit and short circuit conditions test on generator & associated field equipment like generator transformer, unit auxiliary transformer. Recording and monitoring measurement.

7. Testing of protection current transformer for ratio test by primary injection, magnetization characteristic, polarity test, and IR measurement. Functional checks of relays of protection system by primary injection.

8. Testing of potential transformer for ratio test by voltage ratio, polarity test, insulation resistance measurement etc, testing of surge capacitors, PT isolator in PTPS cubicle etc. (theses are housed in generator side line & neutral cubicle).
9. Measurement of Insulation resistance of individual equipment and connected together.
10. Tan delta test on generator & other equipments as required.
11. Calibration of energy meters, tri-vector meters, voltmeters, ammeters, current & power transducers etc.
12. Providing temporary shorting link on bus duct or any other location while testing & normalisation after the test.

13. Testing & commissioning generator circuit breaker.

14. High voltage test on inter connecting cable between generator and line/ neutral side cubicle.

15. Testing of relays, meters, internal devices, functional checks of electrical panels LT MCC, HT breakers and other panels/ equipments.
16. HV test on bus duct bus bar, resistance measurement etc.

17. Contractor shall discuss & finalize testing procedure with BHEL engineer in-charge for the test to be conducted on generator control & relay panel testing. Drawing & documents shall be provided by BHEL at the time of testing. BHEL decision in this regard shall be final and biding on the contractor.

18. Checking & testing of neutral grounding transformer & resistor.

19. Compilation of test records.

20. In case contractor has not done similar work, they are free to tie –up with experienced agency who has carried out similar nature of work and having adequate resources i.e. Experienced manpower, T&P / testing/ measuring instruments. Contractor shall submit documents in support of such tie –up arrangement of such parties along with the offer. Credential of such parties shall be submitted with technical bid along with tie-up MOU.

21. It is to be noted in general that for any testing of protection relays, MCC etc., where the contractor is not sufficiently experienced, they shall arrange for the services of suitable agencies for carrying out the work, within the quoted rates.

a) In case of party quoting for the work have their own resource or resourced capability to take up relay testing etc. At site, **the evidence of same is to be annexed to the technical bid**

OR ALTERNATIVELY

b) As indicated, contractor is free to tie up with experienced agency that has done similar work. The following parties are recommended by BHEL as agencies capable of carrying out these activities:

i. M/S ELCON ENGG
701, CENTRE POINT, ALKAPURI
R C DUTT ROAD, VADODARA 390007
CONTACT PERSON: SHRI ARVIND MEHTA
PH NO 0265-2359152

ii. PINNEL POWER SYSTEM
PILLAIYAR KOIL STREET
JAFFER KHAN PET
CHENNAI 600083
PH NO 044-24718925, 24891975.

iii. CONSULT INDIA, MUMBAI

CONTACT PERSON: SHRI JINGRE.

PH NO 022-25333727

iv. HI TECH ENGINEERING SERVICES

PLOT NO 127, 5TH CROSS STREET, AVM COLONY

VIRUGAMBAKKAM

CHENNAI 600092

CONTACT PERSON: SHRI S. SUBRAMANIEM

PH NO 044-23763520

v. VOLTECH ENGINEERS

ARUNODAYA APARTMENTS,

FLAT B-4, I FLOOR,

27, 2ND MADLEY ST,

T.NAGAR, CHENNAI

CONTACT PERSON: GEETHA

PH NO: 044-28341230

In such event where the relay testing facilities are outsourced by the bidder, the tie-up action taken in this regard by the bidder should be clearly mentioned in their offer (technical bid) and it should be made clear that from which of the above recommended parties such services shall be sourced.

In case the tie-up for the above is with some other party other than those recommended by BHEL, then sufficient proof of the credentials and experience of the party in this field of work shall be annexed to the technical bid.

4.21 GENERATOR SYSTEM TESTING

The following major works also shall be in the scope of the Contractor

1. Generator stator winding resistance and PI value measurement / check
2. Generator rotor winding resistance, impedance, IR value measurement before and after rotor insertion.
3. Generator Bushing HV test
4. Main exciter winding resistance, IR value measurement / check
5. PMG winding resistance, IR value measurement / check
6. Testing and commissioning of generator and exciter accessories viz., heaters, blowers, stroboscope, diodes, enclosure lighting, potential measurement of bearings (TE &EE) etc
7. Meggering during drying out of generator.
8. Meggeriing of generator bushing and its accessories. This test has to be conducted many times during erection and commissioning stages

Other than the above, minor testing / checks will also be involved in the generator area, which are also in the scope of the contractor. *Any instruments / tools etc required for carrying out the above shall be arranged by the contractor within the quoted rates*.

4.22.1 Battery/battery charger/UPS

4.22.1

HDP Tubular 550/600AH or NiCd (or similar type) or Lead acid Batteries will be supplied loose along with battery interconnection in the series/parallel links/bus bar, lugs, steel/wooden battery stand either assembled or knocked down condition, cables and associated charger and UPS system.

4.22.2

In case of Lead acid battery, the electrolyte shall be supplied in plastic cans. After installation, the electrolyte has to be filled in batteries and charging/discharging shall be carried out to achieve specific gravity of electrolyte and stability of battery/battery bank. If required, discharging of the charging cycle shall be repeated to achieve the desired results. However, BHEL engineer's decision shall be final. Any preparatory arrangement required to be done for charging and discharging of battery, the contractor shall arrange consumables, safety equipments etc., at his own cost.

4.22.3

In case of NiCd (or similar type) batteries are normally supplied in charged condition, due care shall be exercised while handling/installation of the same. If the battery charge is found to be less than the required level, the charging/discharging cycle shall be carried out as per instruction of BHEL engineer.

4.22.4

Battery charging/discharging is a continuous process and skilled manpower shall be deployed by the contractor round-the-clock.

4.22.5

Contractor shall arrange suitable load, cables, safety equipments and consumables for discharging the battery during charging and discharging cycle at his cost.

4.22.6

Contractor shall provide skilled manpower for periodic maintenance after the battery are fully charged for the activities such as checking of electrolyte level, specific gravity, topping up with distilled water and cleaning till the set is handed over to customer and record of the same shall be maintained and submitted before handing over of the system.

4.23.0 Instruments and equipments

4.23.1

All field mounted instruments are to be located in such a way as not to obstruct walk-ways or plant equipment access but shall be easily accessible for maintenance. Hand rails shall not be used for mounting or supporting instruments.

4.23.2

Racks/stands and supports for instruments and transmitters shall be fixed on RCC column/floor by chipping and grouting or by welding to steel structure. In no case these shall be welded to floor grills.

4.23.3

The power cylinders support/base erection will be welded to steel structure or by grouting. The power cylinder will be properly aligned and linkage mechanism wherever required shall be connected to the driven equipment. All accessories for power cylinders line air sets, solenoid valves, air lock, limit switches, if supplied loose, shall be fixed, aligned and connected up.

4.23.4

When installing flow and pressure transmitters/switches for Liquid /steam/condensate vapour services, the instrument is to be mounted below its primary element or tapping point. For gas service applications, the instrument is to be mounted above Primary element tapping point.

4.23.5

During erection and commissioning stage, the site mounted instrument shall be protected suitably. Contractor shall provide suitable security arrangement in main control room, and other areas where equipments are positioned, at no extra cost.

4.23.6

All brackets/racks and support steel work for tubing impulse lines/instruments shall be painted with two coats of primer and two coats of final colour prior to installation. Paints, etc supply in the scope of contractor.

4.23.7

Contractor shall arrange for own fire fighting equipments for the materials stored under contractor's custody.

4.24.0 Guidelines for handling and storage of electronic cubicles / subassemblies / loose items.

4.24.1

Immediately after unloading at site, the electronic equipment should be kept in a covered area. Handling and lifting of package should be done without jerks or impacts. Packing case should not be dropped or slid along the floor under any circumstances. Suitable forklift should be used to move the case to its final position. All above points are to be strictly followed as electronic equipments may get damaged due to vibration and shock.

4.24.2

After unloading at site, the package of the equipment shall be inspected for external damage. In case the package is damaged, package number and details of damage should be noted. The details of damage should be reported to concerned site engineer.

4.24.3

Cases should be opened/unpacked using correct nail pullers. While opening the planks, care should be taken to see that equipment inside is not damaged. Cases should not be unpacked in areas where they are exposed to rain, water/liquid splashing, dust or other harmful materials like chlorine gas, sulphur dioxide etc.

4.24.4

After opening the case, all supports provided for transport are to be removed with due care.

4.24.5

Hinged frames should not be opened when equipment is not secured to floor as this is likely to cause it to topple over. The hinged frame can be opened only if the equipment is still fixed on to bottom wooden pallet.

4.25.0 Storage

4.25.1

The equipment should be preferably in its original package and should not be unpacked until it is absolutely necessary for its installation or advised by BHEL engineer. The equipment should be best protected in its cases. It should be arranged away from walls.

4.25.2

The wooden pallet provided for packing itself can be retained for raised platform to protect equipment from ground damps, sinking into around and to circulate air under the stored equipment. This will also help in lifting packing with fork-lifter.

4.25.3

Periodic inspection if silica gel placed inside the equipment is necessary. It has to be replaced or regenerated when decolourisation takes place.

4.25.4

Due care should be taken to ensure that the equipment is not exposed to fumes, gases etc., which can affect electrical contacts of relays and terminal boards.

4.25.5

The storage room and the equipment should be checked at regular interval to ensure protection from termites, mould growth, condensation of water etc., which can damage the equipment.

4.25.6

All the equipments, materials and goods kept in the store room should be identified and registered in a book. Inspection report should be recorded. Any discrepancy observed should be communicated to site engineer.

4.25.7

The packing material shall be retained if the cubicle is to be repacked after inspection.

4.26.0 Sub-assemblies

4.26.1

All subassemblies should be kept in a separate place where it is easily accessible.

4.26.2

Subassemblies should have a protective cover in case it is stored without wooden packing/case to prevent accumulation of dust. Silica gel packets should also be kept along with it.

4.26.3

Subassemblies should not be stacked one above the other.

4.27.0 Loose items

The loose items supplied for the main equipment falls into various categories like tools, cables, prefabricated cables, console inserts, recorders, VDU/CRT, other display units, printers, sensors and transducers, cable glands, cable ducts, frames, racks, etc. These are to be categorised and stored separately.

4.28.0 Guidelines for handling of electronic modules

4.28.1

All the modules shall be handled by qualified persons only.

4.28.2

Electronic modules should only be touched when it is absolutely essential to do so.

4.28.3

Before touching any electronic module, the operator should discharge the static electricity by earthing himself or better still, ensure constant discharge by wearing an earthed wrist strap.

4.28.4

The operator should not wear clothing made entirely from synthetic fibres, but a mixture containing at least 65% cotton.

4.28.5

The PCB should always be held by front panel or by module frame and electronic components / connectors should never be touched.

4.28.6

The electronic modules should not be placed close to television sets or CRT units.

4.28.7

Soldering irons and any other tools used must be grounded.

4.28.8

All modules using CMOS components are packed in antistatic bags when transported loose to avoid ESD failures. The antistatic bags must always be used to transport modules at site from one place to the other.

4.29 MISC. OTHER INSTRUMENT/ EQUIPMENT CALIBRATION, ERECTION, TESTING, AND COMMISSIONING

A. contractor shall carry out testing & commissioning of panels, electrically operated valves, pneumatic control valves, pneumatic trip valves, solenoid valves, limit switches, HT/LT motors including drying out, and any other integral devices forming part of various mechanical skids/equipments, & piping etc.

B. The scope of commissioning of electrically operated actuators for valves, dampers, gates etc., will include meggering, adjustments of mechanical/ electrical or electronic position transmitters, setting of limit/torque switches, cable checking, internal wiring checking, cleaning / heating for increase in IR value, local/remote operation, replacement of limit/torque switches if required, etc.

C. The scope of commissioning of devices like solenoid valves, feedback position transmitters, limit switches, air filter regulators, airlock relays, positioners etc., which are integral part of pneumatic control valves / power cylinders / trip valves electrically operated valves etc., will involve adjustments / servicing, calibration etc. As incidental to work, contractor shall remove such devices prior to erection either at site or at store to avoid damage/pilferage and for keeping in safe custody. These shall be installed at appropriate stage as instructed by BHEL. The above removal and refixing will be done within the quoted rates.

D. Whenever additional instrumentation work viz gauges, transmitters, temperature elements and laying of impulse piping, is to be carried out for performance guarantee test, the same has to be executed by the contractor as per the rate applicable already provided in the rate schedule.

E. Certain instrumentation like pressure switches, pressure gauges, dial thermometers, transmitters etc. are received in assembled condition as integral part of equipments. Dismounting, calibration, and re-erection of such instruments, where required for safe keeping or any other purpose as instructed by engineer, is in the scope of work. Only the rate applicable for calibration for respective instrument item will be paid.

F. All batteries for various AC and DC systems are to be taken into service as per standard method of initial charging and discharging, recording specific gravity values, etc. Contractor has to make arrangement for suitable loads during charging / discharging cycle.

Battery charging/discharging is a continuous process and skilled manpower shall be deployed by the contractor round-the-clock.

Contractor shall arrange suitable load, cables, safety equipments and consumables for discharging the battery during charging and discharging cycle at his cost.

Contractor shall provide skilled manpower for periodic maintenance after the battery are fully charged for the activities such as checking of electrolyte level, specific gravity, topping up with distilled water and cleaning till the set is handed over to customer and record of the same shall be maintained and submitted before handing over of the system.

G. Wherever panels, pneumatic power cylinders and control valves have been erected by the mechanical contractor, calibration/ commissioning has to be carried out by the contractor..

H. In the case of electronic water level indicator , electrodes may be supplied loose and the same need to be fixed in the pressure vessel as per the drawings. No extra charges will be payable.

I. The calibration of position transmitters of the NRVs in the turbine extraction system has to be carried out by the contractor. Position transmitters are to be erected by contractor if supplied loose.

J. Dimension and weight as mentioned against control panels, MCCs, etc. in rate schedule are only approximate and there may be changes in dimension and weight in actual supply of the equipment and no rate variation shall be applicable on this account.

K. Wherever brief description of the system is given under various sub-heads, it is only for the understanding system requirements. It does not indicate the total specification of work. For such system, other clauses are also applicable wherein work details are specified.

L. Normally, cable glands on junction boxes side are received in mounted condition. While terminating the cables as per drawings, the cable glands are to be removed and fixed. Wherever cable glands are not received along with junction boxes, the cable glands as per the requirement will be provided by BHEL and the contractor has to make necessary holes/adjust the available holes in the JB for fixing these. No separate payment will be made for drilling of holes and fixing the cable glands to the junction boxes. Nameplates for JBs will be supplied separately. These are to be suitably written and fixed onto the JBs. Wherever nameplates for JBs are not supplied, the JB no. are to be written with paint on JBs for identification. Separate payment will not be made for this.

M. The push buttons and indicators in C&I systems are provided as loose with different type of connectors. The fixing of connectors and their wiring from push buttons to indicators shall be the responsibility of contractor. No separate payment will be made for fixing of connectors. The cable laying and termination charges will be paid as per applicable rate schedule.

4.30 Calibration, testing & commissioning

Calibration, testing & commissioning activity as specified in this technical specification and rate schedule against various equipments, devices, systems etc. are broadly described hereunder. However, there may be some overlapping between the activities, i.e. Erection, calibration and testing, commissioning. The classification of each activity is only a guideline for understanding the volume of work in each activity. The contractor shall have no claim for performing or providing manpower assistance for such overlapping work, which is also within the scope of work.

Scope of work under erection/calibration/testing/commissioning shall include calibration, setting, adjustment, writing instrument tag number with paint, report making, installation, servicing, minor repairs/servicing, putting instrument into service, signal checking from field upto the functional group panels and remote indicating instrument, functional checks, interlock and protection/alarm checks by simulating the field devices, trouble shooting during pre-commissioning/post-commissioning till system is handed over to the customer.

Contractor shall establish calibration laboratory with adequate facilities and they should arrange standard test instruments duly calibrated from recognized agencies and calibration report of the same to be submitted prior to start of calibration of the field instruments/devices.

A. <u>Calibration</u>

- Verification of instruments for range, type etc; with respect to instrument schedule, data sheet or system document.
- Codification of instruments as per system tag numbers
- Calibration/adjustment of instrument as per system requirement/set values.
- Providing head correction in case of pressure measuring instruments.
- Verification of installation of instruments for range, type, tag number as per physical location of process point as per process, instrumentation diagram.
- Checking and ensuring the proper functioning of instruments.
- All the recorders shall be made functional with proper chart movement and ink marking.
- Preparation of computerised calibration certificates in the formats specified by BHEL Engineers and getting those signed by the customer is in the scope of the contractor.

Completion of erection and commissioning protocols with customer.

B. Erection

- Drawal of material from store, verification, inspection as per shipping list, drawings and documents.
- Preservation, upkeep, safe custody of the erected equipments till handing over.
- Verification of installation as per drawing and document for the correctness of cabling, JBs, impulse pipe, various field device, panels, instruments etc.
- Continuity check & IR value of cables.
- Verification of correction of cable termination with respect to instrument, electrical hook-up diagram, panel interconnection diagram, JB schedule.
- Checking earthing of the equipments and cable shield wire continuity.
- Energizing the functional group control panels and field devices.
- Flushing of impulse pipe before making the instruments process connections through.
- Any leakage damages to impulse pipe, field device connections, air connections etc. Shall be fully attended by contractor.

- Wherever thermowells are supplied along with temperature gauges, thermocouples, temperature switches, thermostats, etc., the contractor has to co-ordinate with the mechanical contractor for identification and fixing of thermowells on the pipeline. However actual fixing of thermowells on pipeline and seal welding shall be done by mechanical contractor and is not a part of instrument installation.

C. TESTING & COMMISSIONING

- Checking/verification of binary/analog input and output signal from field and panel and upto recording/indicating instrument/MMI monitors.
- Adjustment, testing, calibration of pneumatic drive (control valve, trip valve, power cylinder for gate/dampers etc), electrical actuator operated valve/gate/dampers of other functional elements.
- Checking and operating electrical/pneumatic drive through functional group panel, remote control desk, PMS/MMI, CRT operation and repeatability and smooth operation to be checked.
- Checking the interlock, protection and alarm for various processes by stimulation of field devices/process changes.
- Functional check of sub-loop control, sub group control and auto loop and fine-tuning.
- Adjustment of limit switches/feed back position transmitter checking the L.S. of actuator for correct position indication and repeatability shall be ensured.

- HT/LT motor IR value measurement, bearing/winding RTD checking, checking the HT load connector, providing assistance for trial run of motor which includes monitoring temperature rise winding/bearing during trial run.
- Contractor shall prepare calibration/testing report/protocols.
- During trial run of various systems, the performance of any instrument found erratic, un-satisfactory are required re-adjustment, re-calibration etc. Contractor shall attend to the defects.
- Observing and checking the performance of the various devices on load/process variation. Any deficiencies/defect noticed during the variable load conditions, the same shall be attended promptly.
- Observe the proper functioning of sub-group/sub-loop control.
- Check the operation of various control in manual /auto mode for smooth functioning.
- Clearing of all defective signals arising during commissioning and during trial operation of unit.
- Any wiring correction or minor modification in control panel wiring noticed during the pre-commissioning, it shall be carried out.

D. Post-commissioning

- Contractor shall rectify the defect observed/informed by customer during the trial run.
- Contractor shall submit the as- built drawing as per guidelines and instruction of BHEL engineer.
- After trial run/handing over of the equipment, if due to unforeseen reasons, certain works crop up, the contractor shall provide all the assistance.

E. PG Test Assistance

- For PG test assistance, laying of impulse pipes, cables, etc. and installation of instrument tapping points shall be done by the contractor. These activities may be carried out at any point of time before or after Completion of Facilities. Payments will be made as per item rates of comparable similar or identical items in the rate schedule. Such temporary installations shall have to be dismantled and returned to BHEL Stores, after the completion of PG Test for which no separate payment is admissible.

4.31

The work under this scope being quite sophisticated and also quite extensive, for proper planning, monitoring, reporting, etc of ongoing works, the contractor shall establish his own computer(s) and printer(s) at his site office, along with suitable operator(s), consumables, etc*. Non-establishment of above equipment will attract penalty @ Rs 10000 (Rs Ten thousand only) per month.*

BHEL uses its own software SOMS (Site Operation and Management System) for total project execution and billing. The contractor shall also provide adequate and suitable manpower for updating / entries into SOMS in BHEL computers at site.

4.32 TROUBLESHOOTING DURING PLANT OPERATION

During pre commissioning / commissioning stages when the plant will be under various stages of operation, it will be necessary to have continuous (day and night) presence of suitable manpower along with required tools to attend to any defects etc that may arise during such operation. The contractor will be required to put such

personnel in shifts in both electrical and C&I area. The bidder must also take this aspect into consideration.

4.33 Exclusions

The following are specific exclusions from this work.

1. Attachment welding of thermocouple pads for boiler tube metal temperature measurement and fixing of thermowells in the pipelines.
2. Erection of flow nozzles.
3. Erection of valves, actuators along with valves, damper actuators along with dampers, burner tilt power cylinder, seal air dampers and scanner air emergency dampers and control valves. *(However, SADC power cylinder installation will be in the scope of the contractor)*

   Note:

   The aforesaid exclusions should not be construed as exhaustive. They are meant for general guideline. BHEL reserves the right to include or exclude any item which is required for completing the job as per rates indicated in rate schedule. Contractor should carry out all such jobs as per the instructions of BHEL engineer.

SECTION-5

SPECIAL CONDITIONS OF CONTRACT

5.0 Obligations of the contractor (tools, tackles, consumables etc.)

5.1 Accommodation, drinking water & local transportation for the labour other employees

BHEL/client is not providing any land / space for labour / workmen colony. Contractor shall make his own arrangements for accommodation of his labour and staff out side the project premise with necessary facilities including drinking water, Sanitation, Transport, Electricity, FIRST AID & Emergency transport facilities with all other Hygienic requirements etc at his own expenditure. BHEL/client shall not provide any facility in this regard.

5.2 Tools and tackles

5.2.1 The contractor shall provide all required tools and plants, inspection, measuring and test equipments and handling & transportation equipments for transportation of material / equipments from BHEL/ customer stores/ storage yard to erection site for the scope of work covered under these specifications.

Contractor shall arrange suitable capacity of crane for loading of material at BHEL storage yard / re-handling of material, unloading at work place and erection related works and suitable capacity of truck/trailer for transportation of material.

5.2.2 Where required the contractor's tools and tackles deployed for the work may have to have approval of BHEL.

5.2.3 Timely deployment of adequate quantity of T&P is the responsibility of the contractor. The contractor shall be prepared to augment the T&P at short notice to match the planned programme and to achieve the milestones.

5.2.4 Contractor shall maintain and operate his tools and plants in such a way that major breakdowns are avoided. In the event of major breakdown, contractor shall make alternate arrangements expeditiously so that the progress of work is not hampered.

5.2.5 In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make the alternate arrangement at the risk and cost of the contractor.

5.2.6 The T&P to be arranged by the contractor shall be in proper working condition. The operation shall not lead to unsafe condition. The movements of cranes, and other equipment should be such that no damage/breaking occurs to foundation, equipment, material and men. All arrangements for the movement of his T&P etc. shall be the contractor's responsibility.

5.2.7 Normally, for welding only the use of welding generators may be permitted. The use of welding transformers/rectifiers will be subject to the approval of BHEL engineer.

5.2.8 The contractor at his cost shall carry out periodical testing of his construction equipments and calibration of measuring instruments (MMD). Test/ calibration certificates shall be furnished to BHEL. IMTE shall be calibrated only at accredited

laboratory as per the list available with BHEL or any other laboratory approved by BHEL.

5.3 Consumables

5.3.1 The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those, which are specifically indicated as BHEL scope.

5.3.2 Prior approval of BHEL engineer with regard to certain consumables may be required. Test reports/certificates in respect of these consumables, wherever applicable, shall be submitted to BHEL engineer.

5.3.3 Primers, Paints etc.

The contractor shall provide Primer (ROZC as per IS:2074), Synthetic Enamel Paint (IS:2932) and Aluminum Paint – as necessary for respective painting area for the scope of painting work indicated in Section-4 as well as for protection of site weld joints and gas cut locations. Contractor shall also arrange to provide the required thinner and other consumables, T&P and implements etc. required for application of Primer and Paints. All primers, paints and thinners shall be sourced by contractor only from BHEL approved manufacturers. Some of them are as listed under.

1) M/s Asian Paints
2) M/s Berger paints
3) M/s Jenson & Nicholson
4) M/s Shalimar Paints
5) Any other BHEL approved manufacturer.

5.4 Welding Electrodes, Filler Wires for MIG/TIG Welding and Gases

5.4.1 Contractor at his cost shall arrange all the required welding electrodes as approved by BHEL. It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding manufacturer, type and brand name of welding electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL regarding type of electrodes, batch number, date of expiry etc. Batch test certificates shall be made available to BHEL for verification & records.

BHEL reserves the right to reject the use of any electrodes, if found non-acceptable because of bad quality, deterioration in quality due to improper storage, shelf-life expiry, unapproved type/brand etc

5.4.2 All the required gases for welding and gas cutting like Oxygen, Acetylene, Argon (welding quality), Nitrogen etc. shall be arranged by the contractor at his cost.

5.4.3 If at any time during the execution of work, it is noticed that the work is suffering on account of non-availability of consumables from the contractor's side BHEL will make alternate arrangements at the risk and cost of contractor. The expenditure incurred with overheads will be recovered from the contractor.

5.4.4 TEST PIECES FOR WELDERS QUALIFICATION TEST.

The Contractor shall supply materials for Test Pieces for qualification of structural welders. Contractor shall also prepare the test coupons from such materials. All expenses in respect of welders' qualification test shall be to the contractors account.

5.5 Field Office

5.5.1 The contractor shall make his own arrangements for field office and stores for accommodating necessary equipments, tools room for execution of the work. Only open space will be provided by BHEL / customer, free of charges as per the availability of space. The contractor shall make his own arrangements for Construction of field office, store shed/stores. GNFC, Bharuch project having space constraints and Safety as prime Concern & lots of work permit procedures/formalities for excavation, Fabrication, grinding, welding works etc., contractor may decide his portable Type office/stores etc. arrangements. Contractor may have to arrange his own arrangement outside the project premise for accommodation of his T&P and cranes etc. and shall be arranged by contractor at his own expenditure.

5.5.2
On completion of work, all the temporary buildings, structures, pipelines, cables, etc shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the same will be arranged to be removed and expenditure thereof will be recovered from the contractor. The decision of BHEL engineer in this regard shall be final. However, the scope of dismantling and leveling the area is limited only to the contractor's site office, yard and other spaces occupied by the contractor.

5.6 Area Lighting

Contractor shall arrange adequate floodlights, hand lamps and area lighting. Provision of distribution lines for lighting from the single point to the required place with proper distribution boards, observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor including all the materials like cables, fuses, switch boards etc.

5.7 Construction Power & Water

5.7.1 Construction power (415 V, 3 Ph., and 4 Wire) will be provided at available single point at a distance of about 100 Meters from project work site in project premise by customer (GNFC). The construction power for construction purpose will be free of charges; however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor. The contractor shall provide all necessary cables, glands, fuses, switches, switchboards, ELCB, energy meters, capacitor banks etc. for power factor improvement & loss avoiding measures etc. and any other installations as specified by statutory authority in this regard for further drawl of power. Obtaining approvals, payment of necessary fees, duties etc towards the clearance of such installations, prior to their being put to use or as may be specified, shall be the responsibility of the contractor.

5.7.2
It shall be the responsibility of the contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements

at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician.

5.7.3
The contractor shall install necessary capacitor bank etc. with appropriate control mechanism to maintain the power factor as per the guidelines in vogue from time to time in this regard. Any levy imposed by the customer / authority for any deviation in power factor shall be passed on to the contractor.

5.7.4
Contractor shall be well equipped with back-up power supply arrangement like dg set and diesel operated welding machine etc. To tackle situations arising due to failure of customer supplied power, so as to ensure continuity and completion of critical processes that are underway at the time of power failure or important activities planned in immediate future.

5.7.5

BHEL shall not be responsible for any loss or damage to the contractor's equipment as a result of variations in voltage or frequency or interruptions in power supply.

5.7.6 **Construction Water:**

Water for construction purpose will be provided by customer free of charges at available single point inside the plant area. Contractor has to arrange his own distribution system/pumping arrangements etc. for further distribution of construction water. The necessary taxes, duties and levies as imposed by M/s GNFC have to be borne by contractor and the coated rates deemed to have included all this things.

5.7.7
Contrcator shall make his own arrangement of drinking water.

5.7.8
Wherever required & as insisted by Customer, Contractor shall provide and install the meters for usages & metering of construction power & construction water. These meters shall have necessary test certificate from relevant approving authority and shall be used only on clearance from client/BHEL.

5.8 RESPONSIBILITIES WITH REGARD TO LABOUR EMPLOYMENT ETC.

Refer clause 2.8 of general conditions of contract also in this regard.

5.8.1
Contractor shall also comply with the requirements of local authorities / project authorities calling for police verification of antecedents of the workmen, staff etc.

5.8.2

BHEL / customer may insist for witnessing the regular payment to the labour. They may also like to verify the relevant records for compliance with statutory requirements. Contractor shall enable such facilities to BHEL / customer.

5.8.3

It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc for entering the project premises. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer / BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permits for working beyond normal working hours.

5.8.4.

Contractor shall provide at different elevation suitable arrangement for urinal and drinking water facility with necessary plumbing & disposal arrangement including construction of septic tank. These installations shall be maintained in hygienic condition at all times.

5.8.5

If at any time during the execution of work, it is noticed that the work is suffering on account of non-availability/shortfall in provision of resources from the contractor's side, BHEL will make suitable alternate arrangements at the risk and cost of contractor. The expenditure incurred with overheads thereon shall be recovered from the contractor.

5.8.6

The contractor in the event of engaging 10 or more workmen will obtain Independent licence under the contract labour (regulation and abolition) act 1970 from the concerned authorities based on the certificate (form-V) issued by the principal employer/customer. In order to issue the certificate (form-V) by customer, contractor shall fulfill all statutory requirements like Insurance Policy, PF code/PF account number etc. as per requirement of BHEL/Customer.

5.8.7

Contractor will deduct the necessary amount from his employees towards provident fund and contribute the equal amount as per government of india labour laws. This amount will be deposited regularly to the provident fund commissioner and get the account code. Contractor shall submit the above account code duly certified by pf commissioner to BHEL Project In-charge.

5.8.8

It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with Customer/BHEL officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by Customer/BHEL for making gate passes.

5.8.9

BHEL/Customer may insist upon witnessing the regular payment to the labour. They may also like to verify the relevent records for compliance with statutory requirements. Contractor shall enable such facilities to BHEL/Customer.

5.8.10

Contractor shall also comply with the provisions of ESI act in vogue and submit evidence thereof to BHEL site incharge. Also all other employees benefits to be borne by the contractor as per the labour laws. Contractor shall produce necessary certificates towards their compliance with such statutes and payment of all statutory dues.

5.8.11
Contractor shall also comply with the requirements of local authorities / project authorities calling for police verification of antecedents of the workmen, staff etc.

5.8.12
Where permitted, by BHEL/Customer, to work beyond normal working hours, the contractor shall arrange necessary gate passes.

5.8.13
GNFC project premise being in operation and Industrial project, Contractor under these tender specifications shall strictly abide, enforce and follow the basic requirement of safety & Fire requirements, Environmental requirements and Statutory requirements as per their ISO-14001 before the execution of work, during execution of work and after execution of work as per GNFC requirement and instructions of BHEL Engineer at site.

5.9.0 TAXES, DUTIES, LEVIES

Refer to Clause 2.8.4 of General Conditions of Contract. Notwithstanding anything contained therein, the following provisions shall be applicable for this contract.

5.9.1

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

However, provisions regarding Service Tax and Value Added Tax (VAT) on output services and goods shall be as per following clauses.

5.9.2 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Output Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and deposit the same with the concerned tax authorities, such applicable amount will be paid by BHEL.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. **Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely,**

I. **The name, address and the registration number of the contractor,**
II. **The name and address of the party receiving taxable service,**
III. **Description, classification and value of taxable service provided and,**
IV. **The service tax payable thereon.**

All the four conditions shall be fulfilled in the invoice before release of service tax payment.
Contractor shall obtain prior written consent from BHEL before billing the amount towards such taxes.

With introduction of Cenvat Credit Rules 2004, which came into force w.e.f. 10.09.2004, Excise Duty paid on Input Goods including Capital Goods and Service Tax paid on Input Services that are used for providing the output services can be taken credit of against the Service Tax payable on output services. However BHEL may opt for availing the abatement provision in which case cenvat credit may not be available on input duty.

5.9.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be **exclusive** of the same. Where such taxes are required to be paid by the contractor, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. The contractor has to take all necessary steps to **minimize tax on input goods** by purchasing the materials from any registered dealer of the concerned state only. In case contractor opts for composition, it will be with the prior express consent of BHEL. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

5.9.4 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.

5.9.5 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same **before opening of Price Bid**. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

5.10 Submission of Periodical Reports

Contractor shall submit periodical reports in respect of following aspects of operation:

1) Consumption of welding electrodes and gases
2) Consumption of construction power
3) Manpower reports
4) Progress reports – periodically
5) Field calibration reports

BHEL at site will inform formats for these reports.

5.11

It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer/ BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permit for working beyond normal working hours.

5.12 ELECTRICAL INSPECTORATE'S APPROVAL /STATUTORY INSPECTION

5.12.1 Contractor shall have/obtain valid Electrical Contractors License to carry out the Erection, Testing & Commissioning work on High/Low Voltage Electrical Equipments from the appropriate statutory authority of the concerned state or Central Electricity Authority, as the case may be. All fees and expenses in this regard shall be in the contractor's account.

5.12.2 Contractor shall arrange inspection of concerned Statutory Authority for the installation, testing & commissioning of High / Low voltage equipments covered under the scope of work in this tender specification and obtain their approval in appropriate format prior to charging of the equipments.

5.12.3 Contractor shall be responsible for all necessary liasioning work with Statutory Authority towards the certification of installation / works. BHEL will pay Statutory Fees in respect of inspection of installations as per demand note/challan issued by the statutory authority. All other expenses shall be borne by the Contractor. BHEL/ BHEL's Customer shall be providing technical assistance, drawing & document for submission to Statutory Authority. Contractor shall provide all logistics services in this regard.

SECTION-6

SPECIAL CONDITIONS OF CONTRACT

6.0 **Contractor's Obligation with Regard to Employment of Supervisory Staff and Workmen**

6.1 The contractor shall deploy all the skilled/semiskilled/ unskilled labour including highly skilled workmen etc. These workmen should have previous experience on similar job. They shall hold valid certificates wherever necessary. BHEL reserves the right to insist on removal of any employee of the contractor at any time if he is found to be unsuitable and the contractor shall forthwith remove him. Contractor should furnish a tentative deployment plan of his manpower as required vide Appendix-II. Also the actual deployment will be so as to satisfy the erection and commissioning targets set by BHEL.

6.2 It is the responsibility of the contractor to engage his workmen in shifts and or on overtime basis for achieving the targets set by BHEL. This target may be set to suit BHEL's commitments to its customer or to advance date of completion of events or due to other reasons. The decision of BHEL in regard to setting the erection and commissioning targets will be final and binding on the contractor.

6.3 Contractor shall deploy only qualified and experienced engineers/ supervisors. They shall have professional approach in executing the work.

6.4 The contractor's supervisory staff shall execute the work in the most professional manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. They shall be responsible to ensure that the assembly and workmanship conform to dimensions and tolerances given in the drawings/instructions given by BHEL engineer from time to time.

6.5 The supervisory staff employed by the contractor shall ensure proper outturn of work and discipline on the part of the labour put on the job by the contractor. Also in general they should see that the works are carried out in a safe and proper manner and in coordination with other labour and staff employed directly by BHEL or other contractors of BHEL or BHEL's client.

6.6 **WATCH AND WARD**

Contractor has to arrange and provide watch and ward round the clock. Any theft or damage of component due to negligence of the contractor will have to be replaced/repaired by the contractor. The areas are unit control/ESP control room and field.

6.7 **Industrial Relations and Labour Laws**

An industrial relations supervisor shall coordinate for the implementation of local labour laws, maintenance of records as required by contract labour (regulation and abolition) act and also coordinate with the local labour authorities and any other such authorities under whom this work falls.

6.8 If at any time, it is found that the contractor is not in a position to deploy the required engineers/supervisors/workmen due to any reason, BHEL shall have the option to make alternate arrangements at the contractor's risk and cost.

6.9 Site Organization.

Contractor shall employ only qualified and experienced engineers/supervisors for this job. They shall have professional approach in executing the work having adequate knowledge and experience in the fields of erection, erection methodology, calibration, testing and commissioning, quality control and quality assurance procedures, planning, safety etc., required to undertake the type of work as per this tender.

The contractor's supervisory staff shall execute the work in the most substantial and workmanlike manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. They shall be responsible to ensure that the assembly and workmanship conform to dimensions and tolerances given in the drawings/instructions given by BHEL engineer from time to time.

The supervisory staff employed by the contractor shall ensure proper outturn of work and discipline on the part of the labour put on the job by the contractor and in general, see that the works are carried out in a safe and proper manner in coordination with other labour and staff employed directly by BHEL or other contractors of BHEL or BHEL's client.

Contractor should provide a team of engineers with proven experience of erection, testing/ commissioning of electrical equipments as specified in tender specification. They shall be in a position to undertake specific assignments during the start up/ post start up/stabilization.

The contractor shall deploy adequate laboures and supervisory staff in the following areas.

A) Overall planning, monitoring & control

B) Equipments Erection

C) Welding & NDT & Stress Relieving operators, induction.

D) Testing & Commissioning

E) Quality Control and Quality Assurance

F) Materials Management

G) Safety, Fire & Security

H) Industrial Relations and Fulfillment of Labour Laws and Other Statutory Obligations.

Contractor shall furnish an organization chart indicating the staffing pattern for the above functions. Contractor shall provide the names and details of engineer/ supervisors at the time of mobilization to BHEL as per the proposed organization chart.

SECTION-7

SPECIAL CONDITIONS OF CONTRACT

7.0 OBLIGATIONS OF BHEL

7.1 FACILITIES TO BE PROVIDED BY BHEL

Refer Appendix IIB

7.2 SPACES FOR FIELD OFFICE

Refer Section-5 in this regard.

7.3 CONSTRUCTION WATER

Refer Section-5 in this regard.

7.4 CONSTRUCTION POWER

Refer Section-5 in this regard.

7.5 OTHER MATERIALS AND CONSUMABLES:

BHEL shall not provide any material/consumables except those specifically mentioned in the footnote as indicated in **Appendix –II** and tender specification.

7.6 TEST BLANKS (PLATES & PIPES)

Test pieces for qualification of structural welders shall be supplied by the contractor.

7.7 FILLER WIRE FOR TIG WELDING

All the welding consumables shall be arranged by contractor.

7.8 Special tools which are supplied by BHEL Manufacturing Divisions under regular DU/DESS numbers in various product groups as part of maintenance tools which are to be handed over to customer may be issued to the contractor free of charges for specific activities, at the discretion of BHEL. Contractor shall return them after the completion of the specific activity, for which the tools were spared, in good working order.

SECTION-8 (Rev 01, 24/01/2009)
SPECIAL CONDITIONS OF CONTRACT

8.0 Inspection/Quality Assurance/Quality Control/ Statutory Inspection

8.1 Various inspection/quality control/quality assurance procedures/methods at various stages of erection and commissioning will be as per BHEL/customer quality control procedure/codes and other statutory provisions and as per BHEL engineer's instructions.

8.2 Preparation of quality assurance log sheets and protocols with customer/ consultants/statutory authority, welding logs, NDE records, testing & calibration records and other quality control and quality assurance documentation as per BHEL engineer's instructions, is within the scope of work/specification. These records shall be submitted to BHEL/customer for approval from time to time.

The protocols between contractor and customer/ BHEL shall be made prior to installation for correctness of foundations, materials, procedures, at each stage of installation, generally as per the requirement of customer/ BHEL. This is necessary to ensure elimination of errors or keeping them within tolerable limits and to avoid accumulation and multiplication of errors.

8.3 A daily log book should be maintained by every supervisor/engineer of contractor on the job in duplicate (one for BHEL and one for contractor) for detailing and incorporating alignment/clearance / centering / leveling readings and inspection details of various equipments etc.

High pressure welding details like serial number of weld joints, welders name, date of welding, details of repair, heat treatment etc. will be documented in welding log as per BHEL Engineer's instructions.

Record of radiography containing details like serial number of weld joints, date of radiography, repairs, if any, re-shots etc shall also be maintained as per BHEL Engineer's instructions.

Record of heat treatments performed shall be maintained as prescribed by BHEL.

8.4 The performance of welders will be reviewed from time to time as per the BHEL standards. Welders' performance record shall be furnished periodically furnished for scrutiny of BHEL's Engineer. Corrective action as informed by BHEL shall be taken in respect of those welders not conforming to these standards. This may include removal/ discontinuance of concerned welder(s). Contractor shall arrange for the alternate welders immediately.

8.5 All the welders shall carry identity cards as per the proforma prescribed by BHEL/Customer/Consultant. Only welders duly authorized by BHEL/customer/consultant shall be engaged on the work.

8.6 Contractor shall provide all the measuring monitoring devices (MMDs) required for completion of the work satisfactorily. These MMDs shall be of brand, quality and accuracy specified by BHEL Engineer and should have necessary calibration and other certificates as per the requirement of BHEL Engineer. Decision of BHEL Engineer regarding acceptance or otherwise of the measuring instruments/gauges/tools for the work under this specification, is final and binding on the contractor. The indicative list of MMDs required for this work and to be made available by the contractor is given in relevant appendix. The list will be reviewed by BHEL and the contractor shall meet any augmentation needed wherever required.

8.7 It is the responsibility of the contractor to prove the accuracy of the testing/measuring/calibrating equipments brought by him based on the periodicity of calibration as called for in the BHEL's quality assurance standards/BHEL Engineer's instructions.

8.8

Any re-laying or re-termination of cables/re-erection of instruments/ recalibration of instruments etc. required due to contractor's mistake or design requirement and found at any stage inspection, shall be carried out by the contractor at no extra cost.

8.9 BHEL, Power Sector – Western Region (PSWR) has already been accredited with ISO 9002 certification and as such this work is subject to various audits to meet ISO 9002 requirements. One particular aspect which needs special mention is about arrangement of calibration of instruments by the contractor. Contractor shall ensure deployment of reliable and calibrated MMDs (Instrument Measuring and Test Equipment). The MMDS shall have test / calibration certificates from authorised / Government approved / Accredited agencies traceable to National / International Standards. Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer within the contract price. The contractor will also have alternate arrangements for such MMDs so that work does not suffer when the particular equipment / instrument is sent for calibration. Also if any MMDs not found fit for use, BHEL shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall ie repeat the readings taken by that instrument, failing which BHEL may deploy MMD and retake the readings at Contractor's cost.

8.10 Re-work necessitated on account of use of invalid MMDs shall be entirely to the contractor's account. He shall be responsible to take all corrective actions, including resource augmentation if any, as specified by BHEL to make-up for the loss of time.

8.11 In the courses of erection, it may become necessary to carry repeated checks of the work with instruments recently calibrated, re-calibrated. BHEL may counter/ finally check the measurements with their own MMDs. Contractor shall render all assistance in conduct of such counter/final measurements.

8.12 Vibration indicators / vibration recorders / vibration analysers will be provided by BHEL for checking and analysing vibration levels of rotating equipments with necessary operators. Contractor shall provide necessary labour for carrying out such tests.

8.13 Total Quality is the watchword of the work and Contractor shall strive to achieve the Quality Standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and Quality Standards. Contractor shall provide the services of Quality Assurance Engineer.

8.14 Stage Inspection By FES/QA Engineers

Apart from day-to-day inspection by BHEL Engineers stationed at Site and Customer's Engineers, stage inspection of equipments under erection and commissioning at various stages shall also be conducted by teams of Engineers from Field Engineering Services of BHEL's Manufacturing Units, Quality Assurance teams from field Quality Assurance, Unit/Factory Quality Assurance and Commissioning Engineers from Technical Services etc. Contractor shall arrange all labour, tools and tackles etc for such stage inspections free of cost.

8.15 Any modifications suggested by BHEL FES and QA Engineers' team shall be carried out. Claims of contractor, if any, shall be dealt as per Section 13, and provided such modifications have not arisen for reasons attributable to the contractor.

Statutory Inspection of Work

8.16 The work to be executed under these specifications has to be offered for inspection, at appropriate stages of work completion, to various statutory authorities for compliance with applicable regulations.

The work related statutory inspections, though not limited to, are as under:

1) Inspectorate of steam boilers and smoke nuisance

2) Factory Inspector, Labour Commissioner, Electrical Inspector PF Commissioner and other authoritiy connected to this project work

The scope includes getting the approvals from the statutory authorities, which includes arranging for inspection visits of statutory authority periodically as per BHELl Engineer's instructions, arranging materials for ground inspection, taking rub outs for the pressure parts to be offered for inspection, submitting co-related inspection reports, documents, radiographs etc and following up the matter with them. Contractor shall also make all arrangements for offering the Products / Systems for inspection at location, as applicable, to the concerned authority.

8.17 Contractor should be qualified to execute pressure parts & piping work coming under the purview of IBR, for which he should register himself with CIB of state concerned. contractor also should be aware of the latest IBR regulations and Electricity Act, including the amendments thereof.

8.18 All fees connected with the contractors for testing his welders / men / workers and testing, inspection, calibrating of his instruments and equipments, shall be paid by the contractor. It shall be contractor's responsibility to obtain approval of Statutory Authorities, wherever applicable, for the conducting of any work which comes under the purview of these authorities.

8.19 Other fees like fees for periodic visits, hydraulic test fees, light up inspection fees etc. shall be borne by the contractor.

8.20 Payment of Registration fees for Boiler is excluded from the scope.

8.21 BHEL shall pay the ground inspection fees of Boiler Inspectorate. All other arrangements for site visits periodically by Boiler Inspector to site, for obtaining Inspection certificate etc, will have to be made by contractor.

8.22 The quality management system of BHEL, Power Sector – Western Region (PSWR) has already been certified and accredited under ISO 9002 standards in this regard. The basic philosophy of the quality management system is to define the organizational responsibility, work as per documented procedures, verify the output with respect to acceptance norms, identify the non-conforming product/ procedure and take corrective action for removal of non-conformance specifying the steps for avoiding recurrence of such non-conformities, & maintain the relevant quality records. The non-conformities are to be identified through the conduct of periodical audit of implementation of quality systems at various locations/stages of work. Suppliers/vendors of various products/services contributing in the work are also considered as part of the quality management system. .as such the contractor is expected not only to conform to the quality management system of BHEL but also it is desirable that they themselves are accredited under any quality management system standard.

Field Quality Assurance

8.23 Contractor shall carry out all activities conforming to the approved Field Quality Plan (FQP) as revised from time to time. Total quality shall be the watchword of the work and contractor shall strive to achieve the quality standards, procedures laid down by BHEL. He shall follow all the instructions as per BHEL drawings and quality standards. Contractor shall provide the services of quality assurance engineer as per the relevant clauses.

SECTION-9

SPECIAL CONDITIONS OF CONTRACT

Safety, Occupational Health and Environmental Management

BHEL PSWR has been certified for Environmental Management under ISO 14001:1996 standard and Occupational Health & Safety under OHSAS 18001 by DNV. In order to comply with the above standards, it shall be the endeavour of BHEL and all its subcontractors to meet and implement the requirements by following the guidelines issued under Environmental, Occupational Health and Safety Management (EHS) manual a copy of which will be available with the BHEL Site-in-charge.

Contractor shall also enter into a "Memorandum of Understanding" as given in clause 9.9 in case of award of contract.

9.0 Responsibility of the Contractor in Respect of Safety of Men, Equipment, Material and Environment.

9.1 The Contractor shall:

9.1.1

Abide by the Safety Regulations applicable for the Site/Project and in particular as mentioned in the booklet "Safe Work Practices" issued by BHEL. Contractors are also to ensure that their employees and workmen use safety equipments as stipulated in the Factories Act (Latest Revision) during the execution of the work. Failure to use safety equipment as required by BHEL Engineer will be a sufficient reason for issuance of memo, which shall become part of Safety evaluation of the contractor at the end of the Project. Also all site work may be suspended if it is found that the workmen are employing unsafe working practice and all the costs/losses incurred due to suspension of work shall be borne by contractor. A comprehensive list of National Standards from which the contractor can draw references for complying with various requirements under this section is given under 9.10

9.1.2

Hold BHEL harmless and indemnified from and against all claims, cost and charges under Workmen's Compensation Act 1923 and 1933 and any amendment thereof and the contractor shall be solely responsible for the same.

9.1.3

Abide by the Procedure governing entry/exit of the contractor's personnel within the Customer/Client premises. All the contractors employees shall be permitted to enter only on displaying of authorized Photo passes or any other documents as authorized by the Customer/Client.

9.1.4

Be fully responsible for the identity, conduct and integrity of the personnel/workers engaged by them for carrying out the contract work and ensure that none of them are ever engaged in any anti national activity

9.1.5

Prepare a signboard giving the following information and display it near work site:

i) Name of Contractor
ii) Name of Contractor Site-in-charge & Telephone number
iii) Job Description in short
iv) Date of start of job
v) Date of expected completion
vi) Name of BHEL Site-in-charge.

9.1.6
Abide by the rules and regulations existing during the contract period as applicable for the contractors at the Project premises.

9.1.7
Observe the timings of work as advised by BHEL Engineer-in-charge for carrying out the contract work.

9.2 **SPECIAL CONDITIONS**

9.2.1 **Safety**

9.2.1.1 **Safety Plan**

Before commencing the work, contractor shall submit a "safety plan" to the authorized BHEL official. The safety plan shall indicate in detail the measures that would be taken by the contractor to ensure safety to men, equipment, material and environment during execution of the work. The plan shall take care to satisfy all requirements specified hereunder.

The contractor shall submit "safety plan" before start of work. During negotiations, before placing of work order and during execution of the contract, BHEL shall have right to review and suggest modifications in the safety plan. Contractor shall abide by BHEL's decision in this respect.

9.2.1.2
The contractor shall take all necessary safety precautions and arrange for appropriate appliances and/or as per direction of BHEL or it's authorized person to prevent loss of human lives, injuries to men engaged and damage to property and environment.

9.2.1.3
The contractor shall provide to his work force and also ensure the use of Personnel Protection Equipment (PPE) as found necessary and/or as directed and advised by BHEL officials without which permission is liable to be denied.

- Safety helmets conforming to IS 2925/1984 (1990)
- Safety belts conforming to IS 3521/1989
- Safety shoes conforming to IS 1989 part-II /1986(1992)
- Eye and face protection devices conforming to IS 2573/1986(1991), IS 6994 (1973), part-I (1991), IS 8807/1978 (1991), IS 8519/1977(1991).
- Other job specific PPEs of standard ISI make as may be prescribed

9.2.1.4
All tools, tackles, lifting appliances, material handling equipment, scaffolds, cradles, cages, safety nets, ladders, equipment, etc used by the contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained before putting them to use and from time to time as instructed by authorized BHEL official who shall have the right to ban the use of any item found to be unsafe.

9.2.1.5
All electrical equipment, connections and wiring for construction power, its distribution and use shall conform to the requirements of Indian Electricity Act and Rules. Only electricians licensed by the appropriate statutory authority shall be employed by the contractor to carryout all types of electrical works. All electrical appliances including portable electric tools used by the contractor shall have safe plugging system to source of power and be appropriately earthed.

9.2.1.6
The contractor shall not use any hand lamp energized by electric power with supply voltage of more than 24 volts. For work in confined spaces, lighting shall be arranged with power source of not more than 24 volts.

9.2.1.7
The contractor shall adopt all fire safety measures as per relevant Indian Standards

9.2.1.8
Where it becomes necessary to provide and/or store petroleum products, explosives, chemicals and liquid or gaseous fuel or any other substance that may cause fire or explosion, the contractor shall be responsible for carrying out such provisions and/or storage in accordance with the rules and regulations laid down by the relevant government acts, such as petroleum act, explosives act, petroleum and carbides of calcium manual of the chief controller of explosives, Government of India etc. The contractor in all such matters shall also take prior approval of the authorized BHEL official at the site.

9.2.1.9
Proper means of access must be used e.g. ladders, scaffolds, platforms etc. No makeshift access such as oil drums or pallets shall be used. Design of these will be in accordance with relevant standards and certified by competent persons before use.

9.2.1.10
Temporary arrangements made at Site for lifting , platforms, approach access etc should be properly designed and approved before being put to use.

9.2.1.11
All excavations and openings must be securely and adequately fenced/barricaded and warning signs erected when considered necessary as per relevant code of practice.

9.2.1.12
No persons shall remove guardrails, covers or protective devices unless authorized by a responsible supervisor and alternative precautions have been taken

9.2.1.13
Access ways, means of escape and fire exits shall be clearly marked, kept clear and unobstructed at all times

9.2.1.14
Only authorized persons holding relevant license will drive and operate site plant and equipments e.g. cranes, dumpers, excavators, transport vehicles etc

9.2.1.15
Only authorized personnel are allowed to repair, commission electrical equipments.

9.2.1.16
Gas Cylinders shall be handled and stored as per Gas Cylinders Rules and relevant safe working practices

9.2.1.17
All wastes generated at Site shall be segregated and collected in a designated place so as to prevent spillage/contamination/scattering at Site, until the waste is lifted for disposal to designated disposal area as advised by BHEL official.

9.2.1.18
The contractor shall arrange at his cost (wherever not specified) appropriate illumination at all work spots for safe working when natural day light is not adequate for clear visibility.

9.2.1.19
The contractor shall train adequate number of workers/supervisors for administering "FIRST AID". List of competent first aid administers should be prominently displayed.

9.2.1.20
The contractor shall display at strategic places and in adequate numbers the following in fluorescent markings

- Emergency telephone numbers
- Exit, Walkways
- Safe working load charts for wire ropes, slings, D shackles etc
- Warning signs

9.2.1.21
The contractor shall be held responsible for any violation of statutory regulations (local, state or central) and BHEL instructions that may endanger safety of men, equipment, material and environment in his scope of work or other contractors or agencies. Cost of damage, if any, to life and property arising out of such violation of statutory regulations and BHEL instructions shall be borne by the contractor.

9.2.1.22
In case of a fatal or disabling injury/accident to any person at construction sites due to lapses by the contractor, the victim and/or his/her dependents shall be compensated by the contractor as per statutory requirements. However, if considered necessary, BHEL shall have the right to impose appropriate financial penalty on the contractor and recover the same from payments due to the contractor for suitably compensating the victim and/or his/her dependents. Before imposing any such penalty, appropriate enquiry shall be held by BHEL giving opportunity to the contractor to present his case.

9.2.1.23
In case of any damage to property due to lapses by the contractor, BHEL shall have the right to recover cost of such damages from payments due to the contractor after holding an appropriate enquiry.

9.2.1.24

In case of any delay in the completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such delay from payments due to the contractor after notifying the contractor suitably and giving him opportunity to present his case.

9.2.1.25
If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given a reasonable opportunity to do so, and/or if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by the authorized BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.

9.2.1.26 **Emergency Response**

BHEL will have an Emergency Response Plan for each Project Site in consultation with the Owner as the case may be, detailing the procedure for mobilization of personnel and equipment, and defining the responsibilities of the personnel indicated, in order to prepare for any emergency that may arise in order to ensure the priorities of

- Safeguard of life
- Protect assets under construction or neighbouring
- Protect environment
- Resumption of normal operations as soon as the emergency condition is called off

All Contractors shall also be part of the Emergency response Plan and the personnel so nominated shall be aware of their duties and responsibilities in an emergency response situation.

9.2.1.27
At least 5% Contractors supervisors and workmen shall undergo training in administering 'First Aid'. The trained persons should represent for all categories of work and for all areas of work. Adequate number of trained persons should be available for each shift. These first aides shall be included in the emergency response team. Contractor employees and workmen are encouraged to participate in first aid training programmes whenever organized by BHEL.

9.2.2 OCCUPATIONAL HEALTH

9.2.2.1
Specific occupational health hazards will be identified through the hazard evaluation processes in consultation with BHEL engineers and the necessary prevention/reduction/elimination methods implemented.

9.2.2.2
All personnel working in an activity with a potential risk to health shall be made aware of all those risks and the actions they must take to reduce/control/eliminate the risk

9.2.2.3

Safety coordinator shall conduct periodic checks to ensure that every group of workers engaged in similar activities are aware of potential risks to health and the actions required to be taken to mitigate the risk

9.2.2.4
In order to protect personnel from associated health hazards, the following main areas will be focused

- Issue of approved Personnel Protective Equipment
- Verification that the PPE are adequate/maintained and worn by all staff involved in operations that are potentially hazardous to their health
- Ensure that the personnel deployed are physically fit for the operation/work concerned
- Provide hygienic and sanitary working conditions

9.2.2.5
Contractor workers employees engaged in noise risk areas shall be issued with hearing protection aids and the use of the same will be enforced. Further, these workers will be educated on the hazards of noise

9.2.2.6
Contractor workers engaged in dust environment shall be issued with necessary dust protection aids and the use of the same shall be enforced

9.2.2.7
Workers engaged in exposure to bright light/rays as in welding or radiation shall be issued with eye protection devices and the use of the same shall be enforced

9.2.2.8
Adequate arrangements shall be made to provide safe drinking water

9.2.2.9
Health monitoring records on at least sample basis for contractor employees & workmen shall be maintained for persons engaged in specified categories of work. These shall include

- Noise induced hearing loss
- Lung Function test
- Ergonomic Test
- Eye Test for Welders, Grinders, Drivers etc

9.2.3.0 HYGIENE and HOUSEKEEPING

9.2.3.1
Good house keeping and proper hygiene is one of the key requirements of Occupational Health Safety and Environment management. Towards this the contractor shall encourage his workers and supervisors to maintain cleanliness in their area of work.

9.2.3.2
The Contractor shall arrange to place waste bins/chutes at convenient locations for the collection of scrap and other wastes. The bins shall be clearly marked and segregated for metal, non-metal, hazardous and non hazardous wastes.

9.2.3.3
BHEL may take up appropriate remedial measures at the cost of the contractors if the contractors fail in good house keeping and if there is an imminent risk of pollution

9.2.4 ENVIRONMENT MANAGEMENT

9.2.4.1
BHEL has a sound environmental management system, which is to be maintained and implemented by all the contractors. The system allows for project specific objectives to be set and developed sensitive to client requirements, applicable environmental legislation and BHEL's own objectives and policy. BHEL engineers will assess and monitor the environmental impact of their work and lay out objectives for their minimization. The contractors shall implement the objectives for continual improvement of environmental performance. BHEL shall regularly audit environmental impacts and their improvements.

9.2.4.2 WASTE MANAGEMENT

9.2.4.3.1
The objective of waste management is to ensure the safe and responsible disposal of waste, ensuring that it is correctly disposed of and being able to audit the process to ensure compliance.

9.2.4.3.2
Chemical wastes if any shall be collected separately and disposed of to BHEL designated refuse yard as per BHEL advice.

9.2.4.3.3
No dangerous chemicals, noxious waste products or materials will be disposed off on or off site without approval obtained through BHEL.

9.2.4.3.4
All disposal of wastes generated during construction shall be in accordance with all relevant legislation.

9.2.4.3.5
Acid and alkali cleaning wastes shall be neutralized to acceptable norms before disposal to the designated area.

9.2.4.3.6
All necessary measures shall be taken to ensure safe collection and disposal of waste oils. In particular to ensure the prevention of their discharge into surface waters, ground waters, coastal waters or drainages

9.3 **SUPERVISION**
9.3.1
Contractor must provide at least one full time on site safety coordinator when the manpower engaged is in excess of 50 for the contract activities in the premises. If the manpower is less than 50, the on site safety coordination responsibilities shall be assumed by any one

of the contractor's other supervisory staff; however in both the cases, the contractor must specify in writing the name of such persons to the BHEL Engineer in Charge.

9.3.2

Contractor's safety coordinator or his supervisor responsible for safety as the case may be shall conduct at his work site, and document formal safety inspection and audits at least once in a week. Such documents are to be submitted to BHEL Engineer in Charge for his review and record.

Contractor, supervisor must attend all schedule safety meetings as would be intimated to him by the BHEL Engineer in Charge.

9.3.3

Before starting work under any contract, the contractor must ensure that a job specific safety procedures/field practices as required over and above the safety permit conditions are prepared and followed .He should also ensure that all supervisors and workers involved understand and follow this procedures /field practices.

9.3.4

Contractor must ensure that in his work site appropriate display boards are put displaying signs for site safety, potential hazards and precautions required.

9.4.0 **TRAINING & AWARENESS**

9.4.1

Contractor shall deploy experienced supervisors and other manpower who are well conversant with the safety and environment regulations of the Project. The electricians to be deployed on the job should have wireman license.

9.4.2

All Supervisors & Workmen of the Contractor shall undergo Fire safety training/ demonstration whenever arranged by BHEL with the help of either Customer's Fire and Safety department or outside faculty so as to acquire knowledge of fire prevention and also to be able to make use of appropriate fire extinguishers.

9.4.3

Contractor must familiarize himself from BHEL Engineer in Charge about all known potential fire, explosion or toxic release hazards related to the contract. He in turn will ensure that same information has been passed to the supervisors and workmen

9.4.4

Contractor must ensure that all his supervisors are properly trained and each employee has received and understood from his supervisor necessary training and briefing about the

safety requirement. Necessary document as a means to verify that employees have understood the training is to be maintained.

9.4.5
The contractor supervisors shall also give a small safety briefing to all the workmen under his charge before undertaking any new work and specially understand the safety requirements that are mandatory

9.5.0 **REPORTING**

9.5.1
The contractor shall submit report of all accidents, fires and property damage, dangerous occurrences to the authorized BHEL official immediately after such occurrence but in any case not later than twelve hours of the occurrence. Such report shall be furnished in the manner prescribed by BHEL and also to meet statutory requirement.

9.5.2
Any injury sustained by any of the contractor's employees within the Project premises must be reported to BHEL supervisor and FIRST AID should be immediately administered. The Contractor shall be responsible for keeping and maintaining proper records of Accidents to his personnel.

9.5.3
Contractor must arrange to immediately investigate, properly document and report any injury, accident or near miss involving any of his employees and take appropriate follow up action. He must furnish within 12 hours of the incident a written report to BHEL Engineer in charge and the Safety Section.

9.5.4
According to the Factory Act and the Employees state Insurance Act & regulation, any person sustaining any injury within the project premises and absenting himself from work for more than 46 hours, his accident report has to be sent to the respective Government Authorities. Therefore contractor shall inform the owner's representative such matter immediately for their needful action.

9.5.5
In addition, contractor shall submit periodic reports on safety to the authorised BHEL official from time to time as prescribed.

9.5.6
Before commencing the work, the contractor shall appoint/nominate a responsible officer to supervise implementation of all safety measures and liaison with his counterpart of BHEL.

9.6 AUDIT REVIEW AND INSPECTION

9.6.1
BHEL shall conduct audit on the contractor performance and compliance with the project specific requirements of the Environment and Occupational Health & Safety Management systems. The programme of audit shall cover all activities under the contract but will focus particularly on high-risk activities. The Construction Manager shall decide the schedule of

audit. The audit findings shall be communicated to the contractors and necessary remedial action as advised by BHEL Engineers shall be under taken within the stipulated time.

9.6.2
Inspections shall be carried out regularly by the contractors and by BHEL Engineers on activities, facilities, equipment, documentation, to cover the following aspects.

- Compliance with procedures and systems
- Availability, condition and use of PPE
- Condition of maintenance tools, equipments, facilities
- Availability of fire fighting equipments and its condition
- Use of fire fighting equipments and first aid kit
- Awareness of occupational health hazard
- Awareness of safe working practices
- Presence of quality supervision
- Housekeeping

The Safety coordinator shall visit and inspect work sites daily. All unsafe acts, unsafe conditions that have imminent potential for causing harm/injury/damage will be immediately corrected. He shall maintain a daily logbook giving details of unsafe acts or conditions observed and the corrective action taken and recommendations for preventing recurrence. Adequacy of corrective actions will be verified

The contractor shall take remedial measures as per the findings of each inspection
Besides the above, the contractor shall be required to carry out the following inspections

Sl no	**Equipment**	**Scope of inspection**	**Inspection by**	**Schedule**
1	Hand tools	To identify unsafe/defective tool	User	Daily
2	Power tools	To identify unsafe/defective tool	User	Daily
3	Fire Extinguishers	To check pressure and any defect	User / Safety Coordinator	Daily Every month
4	Lifting equipment/tackles	To check for defects and efficacy of brakes	User Third party	Daily Every Year
5	PPE	To check for defects	User	Daily

9.7 NON COMPLIANCE:-

9.7.1
NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND THE BHEL HAS RIGHT TO IMPOSE FINES ON THE CONTRACTOR AS UNDER **for every instance of violation noticed**:

Sl. No	**Instance of Violation**	**Fine (in Rs)**

Sl. No	Instance of Violation	Fine (in Rs)
01	Not Wearing Safety Helmet	50/-
02.	Not wearing Safety Belt	100/-
03.	Grinding Without Goggles	50/-
04.	Not using 24 V Supply For Internal Work	500/-
05.	Electrical Plugs Not used for hand Machine	100/-
06.	Not Slinging property	200/-
07.	Using Damaged Sling	200/-
08.	Lifting Cylinders Without Cage	500/-
09.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
10.	Not Removing Small Scrap From Platforms	200/-
11.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	200/-
12.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
13.	Improper Earthing Of Electrical T&P	500/-
	Major Accident or Accidents causing partial loss of earning to the victim	50,000/- per victim
14	Fatal Accident or Accidents causing permanent loss of earning to the victim	1,00,000/- per victim

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the contractor. The amount collected above will be utilised for giving award to the employees who could avoid accident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.

9.8

CITATION:-If safety record of the contractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognize the safety performance of the contractor may be considered by BHEL after completion of the job

9.9 Memorandum of Understanding

After Award Of Work, Contractors Are Required To Enter Into A Memorandum Of Understanding As Given Below:

Memorandum of Understanding

BHEL, PS WR is committed to Health, Safety and Environment Policy (EHS Policy) as given in the booklet titled " Safe Working Practices" issued to all contractors.

M/s _____ do hereby also commit to the same EHS Policy while executing the Contract Number _____

M/s _____ shall ensure that safe work practices not limited to the above booklet are followed by all construction workers and supervisors. Spirit and content therein shall be reached to all workers and supervisors for compliance.

BHEL will be carrying out EHS audits twice a year and M/s _____ shall ensure to close any non-conformity observed/reported within fifteen days.

Signed by authorized representative of M/s----------

Name :

Place & Date:

9.10

Comprehensive list of National Standards for reference and use wherever applicable in the execution of Civil, Erection and Commissioning Contracts.

IS No	YEAR	Amd upto	DESCRIPTION
IS 10204	1982		PORTABLE FIRE EXTINGUISHERS MECHANICAL FOAM TYPE
IS 10245	1994		SPECIFICATION FOR BREATHING APPARATUS
IS 10291	1982		SAFETY CODE FOR DRESS DRIVERS IN CIVIL ENGINEERING WORKS
IS 10658	1983		HIGHER CAPACITY DRY POWDER FIRE EXTINGUISHERS (TROLLEY MOUNTED)
IS 10662	1992		COLOUR TELEVISION
IS 10667	1983		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF FOOT AND LEG
IS 11037	1984		ELECTRONIC FAN REGULATORS
IS 11057	1984		INDUSTRIAL SAFETY NETS
IS 11451	1998		RECOMMENDATION FOR SAFETY AND HEALTH REQUIREMENT RELATING TO OCCUPATION EXPOSURE TO ASBESTOS
IS 1169	1967		PEDESTAL FANS
IS 1179	1967		SPECIFICATION FOR EQUIPMENT FOR EYE AND FACE PROTECTION DURING WELDING
IS 11833	1986		DRY POWDER FIRE EXTINGUISHERS FOR METAL FIRES
IS 11972	1987		CODE OF PRACTICE FOR SAFETY PRECAUTION TO BE TAKEN WHEN ENTERING A SEWARAGE SYSTEM
IS 1287	1986		ELECTRIC TOASTER
IS 13063	1991		STRUCTURAL SAFETY OF BUILDINGS ON SHALLOW FOUNDATIONS ON ROCKS
IS 13385	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE WHEEL MOUNTED WATER TYPE (GAS CARTRIDGES)

IS No	YEAR	Amd upto	DESCRIPTION
IS 13386	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE MECHANICAL FOAM TYPE
IS 13415	1992		CODE OF SAFETY FOR PROTECTIVE BARRIERS IN AND AROUND BUILDINGS
IS 13416	1992		RECOMMENDATIONS FOR PREVENTIVE MEASURES AGAINST HAZARDS AT WORKING PLACE PART 1 TO PART 5
IS 13430	1992		CODE OF PRACTICE FOR SAFETY DURING ADDITIONAL CONSTRUCTION AND ALTERATION TO EXISTING BUILDINGS
IS 13849	1993		PORTABLE FIRE EXTINGUISHERS DRY POWDER TYPE (CONSTANT PRESSURE)
IS 1446	1985		CLASSIFICATION OF DANGEROUS GOODS (FIRST REVISION)
IS 1476	1979		REFRIGERATORS
IS 1641	1988		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): GENERAL PRINCIPLES OF FIRE GRADING AND CLASSIFICATION
IS 1642	1989		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS-DETAILS OF CONSTRUCTION
IS 1643	1988		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): EXPOSURE HAZARD
IS 1646	1997		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): ELECTRICAL INSTALLATIONS
IS 1904	1986		CODE OF PRACTICE FOR DESIGN AND CONSTRUCTION OF FOUNDATIONS IN SOIL
IS 1905	1987		STRUCTURAL SAFETY OF BUILDINGS MASONARY WALLS
IS 2082	1985		ELECTRICAL GEYSERS
IS 2171	1985		PORTABLE FIRE EXTINGUISHERS DRY POWDER TYPE (CARTRIDGE)
IS 2309	1989		PRACTICE FOR THE PROTECTION OF BUILDINGS AND ALLIED BUILDINGS AGAINST LIGHTENING
IS 2312	1967		EXHAUST FANS
IS 2361	1994		SPECIFICATION FOR BUILDING GRIPS - FIRST REVISION
IS 2418	1977		TUBULAR FLUORSCENT LAMPS IS 2418 (FT-1)
IS 2750	1964		STEEL SCAFFOLDINGS
IS 2762	1964		SAFE WORKING LOADS IN KGS FOR WIRE ROPE SLINGS
IS 2878	1986		FIRE EXTINGUISHERS CARBON DIOXIDE TYPE (PORTABLE AND TROLLEY MOUNTED)
IS 2925	1984		SPECIFICATION FOR INDUSTRIAL SAFETY HELMETS
IS 3016	1982		CODE OF PRACTICE FOR FIRE PRECAUTIONS IN WELDING AND CUTTING OPERATIONS- FIRST REVISION
IS 3315	1974		DESERT COOLERS
IS 3521	1989		INDUSTRIAL SAFETY BELTS AND HARNESS
IS 368	1983		IMMERSION WATER HEATERS
IS 3696	1991		SAFETY CODE OF SCAFFOLDS AND LADDERS PART 1 TO 2
IS 3737	1996		LEATHER SAFETY BOOTS FOR WORKERS IN HEAVY METAL

IS No	YEAR	Amd upto	DESCRIPTION
			INDUSTRIES
IS 374	1979		CEILING FANS INCLUDING REGULATORS
IS 3764	1992		EXCAVATION WORK - CODE OF SAFETY
IS 3786	1983		METHOD FOR COMPUTATION OF FREQUENCY AND SEVERITY RATES FOR INDUSTRIAL INJURIES AND CLASSIFICATION OF INDUSTRIAL ACCIDENTS
IS 3935	1966		CODE OF PRACTICE FOR COMPOSITE CONSTRUCTION
IS 4014	1967		CODE OF PRACTICE FOR STEEL TUBULAR SCAFFOLDING
IS 4081	1986		SAFETY CODE FOR BLASTING AND RELATED DRILLING OPERATIONS
IS 4082	1977	1996	STACKING AND STORAGE OF CONSTRUCTION MATERIALS AND COMPONENTS AT SITE
IS 4130	1991		DEMOLITION OF BUILDINGS - CODE OF SAFETY PART 1 TO 2
IS 4138	1977		SAFETY CODE FOR WORKING IN COMPRESSED AIR (FIRST REVISION)
IS 4155	1966		GLOSSARY OF TERMS RELATING TO CHEMICAL AND RADIATION HAZARDS AND HAZARDOUS CHEMICALS
IS 4209	1967		CODE OF SAFETY FOR CHEMICAL LABORATORY
IS 4250	1980		FOOD MIXERS
IS 4262	1967		CODE OF SAFETY FOR SULFURIC ACID
IS 4756	1978		SAFETY CODE FOR TUNNELING WORK
IS 4912	1978		SAFETY REQUIREMENTS FOR FLOOR AND WALL OPENINGS, RAILINGS AND TOE BOARDS
IS 5121	1969		SAFETY CODE FOR PILING AND OTHER DEEP FOUNDATIONS
IS 5182	1969	1982	METHODS FOR MEASUREMENT OF AIR POLLUTION
IS 5184	1969		CODE OF SAFETY FOR HYDROFLUORIC ACID
IS 5216	1982	2000	RECOMMENDATIONS ON SAFETY PROCEDURES AND PRACTICE IN ELECTRICAL WORK PART I AND II
IS 555	1979		TABLE FANS
IS 5557	1995		INDUSTRIAL AND SAFETY LINED RUBBER BOOTS (SECOND REVISION)
IS 5916	1970		SAFETY CODE FOR CONSTRUCTION INVOLVING USE OF HOR BITUMINOUS MATERIALS
IS 5983	1980		SPECIFICATION FOR EYE PROTECTORS - FIRST REVISION
IS 6234	1986		PORTABLE FIRE EXTINGUISHERS WATER TYPE (STORED PRESSURE)
IS 692	1994		CRITERIA FOR SAFETY AND DESIGN OF STRUCTURES SUBJECTED TO UNDERGROUND BLASTS
IS 6994	1973		SPECIFICATION FOR SAFETY GLOVES
IS 7155	1986		CODE OF RECOMMENDED PRACTICE FOR CONVEYOR SAFETY (PART 1 TO 8)
IS 7205	1974		SAFETY CODE FOR ERECTION OF STRUCTURAL STEEL WORK
IS 7293	1974		SAFETY CODE FOR WORKING WITH CONSTRUCTION MACHINERY

IS No	YEAR	Amd upto	DESCRIPTION
IS 7323	1994		GUIDELINES FOR OPERATIONS OF RESERVOIRS
IS 7812	1975		CODE OF SAFETY FOR MERCURY
IS 7969	1975		SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS
IS 8089	1976		CODE OF SAFE PRACTICE FOR LAYOUT OF OUTSIDE FACILITIES IN AN INDUSTRIAL PLANT
IS 8091	1976		CODE OF PRACTICE FOR INDUSTRIAL PLANT LAYOUT
IS 8095	1976		ACCIDENTS PREVENTION TAGS
IS 818	1968	1997	CODE OF PRACTICE FOR SAFETY AND HEALTH REQUIREMENTS IN ELECTRIC AND GAS WELDING, AND CUTTING OPERATIONS
IS 8448	1989		AUTOMATIC LINE VOLTAGE CORRECTOR (STABILISER)
IS 8519	1977		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR BODY PROTECTION
IS 8520	1977		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR EYE, FACE AND EAR PROTECTION
IS 875	1987		STRUCTURAL SAFETY OF BUILDING: LOADING STANDARD PART 1 TO 5
IS 8807	1978		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF ARMS AND HANDS
IS 8978	1985		INSTANTANEOUS WATER HEATERS
IS 8989	1978		SAFETY CODE FOR ERECTION OF CONCRETE FRAMED STRUCTURES
IS 940	1989		PORTABLE FIRE EXTINGUISHERS WATER TYPE (GAS CARTRIDGE)
IS 9457	1980		SAFETY COLOURS AND SIGNS
IS 9679	1980		CODE OF SAFETY FOR WORK ENVIRONMENTAL MONITORING
IS 9706	1997		CODE OF PRACTICE FOR THE CONSTRUCTION OF AERIAL RPEWAYS FOR THE TRANSPORTATION OF MATERIAL
IS 9759	1981		GUIDELINES FOR DEWATERING DURING CONSTRUCTION
IS 9815	1989		SERVO MOTOR OPERATED LINE VOLTAGE CORRECTOR (SERVO STABILISER)
IS 9944	1992		RECOMMENDATIONS ON SAFE WORKING LOAD FOR NATURAL AND MAN-MADE FIBRE ROPE SLINGS
IS 996	1979		SINGLE PHASE ELECTRIC MOTORS
ISO 3873	1977		SAFETY HELMET

SECTION-10

DRAWINGS AND DOCUMENTS

10.1
THE DETAILED DRAWINGS, WILL BE ISSUED TO THE CONTRACTOR DURING THE EXECUTION AT SITE. WORK SHALL BE CARRIED OUT AS PER THE **"RFC"** RELEASED FOR CONSTRUCTION DRAWINGS

10.2
TWO SETS OF NECESSARY DRAWINGS/DOCUMENTS TO CARRY OUT THE WORK WILL BE FURNISHED TO THE CONTRACTOR BY BHEL ON LOAN, WHICH SHALL BE RETURNED TO BHEL AFTER COMPLETION OF THE WORK. CONTRACTOR'S PERSONNEL SHALL TAKE CARE OF THESE DOCUMENTS GIVEN TO THEM.

10.3
The data furnished in various sections and appendices and the drawings enclosed with this tender specification describe the equipment to be installed, tested and commissioned under this specification, briefly. However, the changes in the design and in the quantity may be expected to occur as is usual in any such large scale of works.

10.4
If any error or ambiguity is discovered in the specification/information contained in the documents/drawings and tender, the contractor shall forthwith bring the same to the notice of BHEL before submission of offer.

10.5
In case an ambiguity is detected after award of work, the same must be brought to the notice of BHEL before commencement of the work/activity. BHEL's interpretation in such cases will be final and binding on the contractor.

SECTION-11

SPECIAL CONDITIONS

11.0 TIME SCHEDULE, MOBILIZATION, PROGRESS MONITORING, PRICE VARIATION, OVER RUN ETC.

11.1 TIME SCHEDULE & MOBILIZATION

11.1.1 INITIAL MOBILIZATION AND TENTATIVE SCHEDULE

CONTRACTOR SHALL REACH SITE, MAKE HIS SITE ESTABLISHMENT AND BE READY TO COMMENCE THE TOP PRIORITY ACTIVITIES **WITHIN ONE MONTH FROM THE DATE OF FAX LETTER OF INTENT** OR AS PER DIRECTIONS OF CONSTRUCTION MANAGER OF BHEL.

THE CONTRACTOR HAS TO SUBSEQUENTLY AUGMENT HIS RESOURCES IN SUCH A MANNER THAT THE ENTIRE WORK IS COMPLETED TO ACHIEVE THE FOLLOWING TENTATIVE SCHEDULE:

SN	MILESTONE	COMPLETION SCHEDULE FROM START OF HRSG ERN.
01	HRSG DRUM LIFTING (HP + LP)	Apr 2010
02	HYDRAULIC TEST	June 2010
03	GT CRANKING	June 2010
04	FSNL OF GT	July 2010
05	GT SYNCHRNIZATION (OPEN CYCLE)	July 2010
06	GAS IN	Aug 2010
07	ALKALI BOIL OUT	Aug 2010
08	SVF & STEAM BLOWING	Aug 2010
09	CO-GEN OPERATION	Sep 2010

The contractor shall reach site and establish his site office and mobilize to commence the work as per directions of BHEL's Construction Manager. **The contract shall commence from the date of deployment of contractor's T&P, proper site setup and erection of first equipment. All the above three conditions are to be fulfilled (certified by BHEL engineer) for deciding the date of commencement of the contract.**

11.1.2
In order to meet the completion schedule for above major milestones in general, and all other intermediate targets set during the course of execution, contractor shall arrange all necessary resources in consultation with BHEL.

11.1.3 CONTRACT PERIOD

The total contract period will be 10 (ten) months from the date of start of erection.

11.1.4 GRACE PERIOD

GRACE PERIOD NOT APPLICABLE

11.2 PROGRESS MONITORING, CONTRACT EXTENSION AND OVERRUN

SHALL BE AS PER GCC (GENERAL CONDITIONS OF CONTRACT) OF THIS TENDER

11.2.3 CONTRACT EXTENSION

SHALL BE AS PER GCC (GENERAL CONDITIONS OF CONTRACT) OF THIS TENDER

11.2.6 OVERRUN COMPENSATION

SHALL BE AS PER GCC (GENERAL CONDITIONS OF CONTRACT) OF THIS TENDER

11.3 PRICE VARIATION

SHALL BE AS PER GCC (GENERAL CONDITIONS OF CONTRACT) OF THIS TENDER

11.4 CONTRACT VARIATIONS

SHALL BE AS PER GCC (GENERAL CONDITIONS OF CONTRACT) OF THIS TENDER

11.5 INTEREST BEARING RECOVERABLE ADVANCE

SHALL BE AS PER GCC (GENERAL CONDITIONS OF CONTRACT) OF THIS TENDER

11.6 DEFINITION OF WORK COMPLETION

THE CONTRACTOR'S SCOPE OF WORK UNDER THESE SPECIFICATIONS WILL BE DEEMED TO HAVE BEEN COMPLETED IN ALL RESPECT, ONLY WHEN ALL THE ACTIVITIES ARE COMPLETED SATISFACTORILY AND SO CERTIFIED BY BHEL SITE IN CHARGE. THE DECISION OF BHEL IN THIS REGARD SHALL BE FINAL AND BINDING ON THE CONTRACTOR.

SECTION-12
SPECIAL CONDITIONS OF CONTRACT

12.0 TERMS OF PAYMENT

12.0.1
The contractor shall submit his monthly RA account bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas for the previous calendar month.

Note: Contractor shall maintain good house keeping & collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. ***1% value of each RA bill will be earmarked against compliance of the above, to be released only on satisfactory collection and deposit of scrap as stated above. In case of failure of contractor to comply with this requirement, BHEL will make suitable arrangement at contractor's risk and cost. In such case, any expenditure over and above the withheld 1% amount will also be recovered suitably from the RA bills of vendor***

12.0.2
GCC (general conditions of contract) shall be referred to as regards mode of payment, and measurement of the work completed.

12.0.3
Release of payment in each running bill will be restricted to 95% of the value of work admitted, as per the percentage break-up for the stage of work completion stipulated vide clauses hereinafter.

The 5% thus remaining shall released as specified in GCC .

12.0.4
The payment for running bills will normally be released within around 30 days of submission of running bill with measurement sheets. Contractor shall make his own arrangement for making payment of impending labour wages and other dues in the meanwhile.

12.0.5
BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS. In order to implement this system, the following details are to be furnished by the Contractor pertaining to his Bank Accounts where proceeds will be transferred through BHEL's banker:

1 Name of the Company
2 Name of Bank
3 Name of Bank Branch
4 City/Place
5 Account Number
6 Account type
7 IFSC code of the Bank Branch
8 MICR Code of the Bank Branch

BHEL may also choose to release payment by other alternative modes as suitable.

12.1 .0 STAGES OF PROGRESSIVE PRO-RATA PAYMENTS

The agreed rates for each item shall be paid progressively as per the break up given hereunder (aggregating 100%), based on the progress of work in each month.

SL NO	TYPE OF PAYMENT (Refer Rate Schedule)	CALIBRATION	ERECTION	TESTING AND COMMISSIONING	FINAL PAINTING	CABLE DRESSING /TAGGING
1	A	NA	55%	40%	5%	NA
2	B	NA	60%	40%	NA	NA
3	C	NA	60%	40%	NA	NA
4	D	NA	55%	40%	5%	NA
5	E	NA	60%	40%	NA	NA
6	F	NA	55%	40%	5%	NA
7	G	NA	95%	NA	NA	5%
8	H	NA	100%	NA	NA	NA
9	I	NA	95%	NA	5%	NA
10	J	NA	60%	40%	NA	NA
11	K	NA	95%	NA	5%	NA
12	L	NA	95%	NA	5%	NA
13	M1	NA	55%	40%	5%	NA
14	M2	NA	95%	NA	NA	5%
15	N1	NA	55%	40%	5%	NA
16	N2	45%	55%	NA	NA	NA
17	N3	NA	100%	NA	NA	NA
18	O	NA	NA	100%	NA	NA

12.1.1
For the items where the payment is to be made against unit of weight, the actual weight of items erected by contractor will be paid after assessing the weight on the basis of shipping list or standard engineering practice. BHEL engineer's decision will be final and binding on contractor in this regard.

12.2 MEASUREMENT OF THE WORK COMPLETED

12.2.1
The Bidder shall quote separate unit rates for each item as detailed in Rate Schedule. Payment will be made by BHEL according to agreed item rates, break up of stage payments and actual executed quantities.

12.2.2
In rate schedules, all inclusive unit rates have been called for entire scope of work for respective item including erection, calibration, testing and commissioning as applicable for various device and instrument and payment shall be made as per split up furnished in the table earlier in this section.

12.2.3

For all payment purpose, measurement shall be made on the basis of physical measurement. contractor shall make physical measurement in presence of BHEL engineer. Contractor shall maintain records for utilization of material system-wise.

12.2.4
All the surplus, scrap and serviceable materials shall be returned by the contractor to BHEL's stores as per the instruction of engineer.

12.25
All the cables returned to stores should carry aluminium tag(s) indicating the size and type of cables. Cable of more than five -meter lengths is termed as "serviceable material".

12.2.6
Any item returned to stores shall be clearly identified and tagged for its serviceability or any defects in the returned items.

12.27
Wherever additional instrumentation work has to be carried out for performance guarantee test, the same has to be executed by the contractor as per the applicable rates already provided in the rate schedule.

12.2.8
For the items where the payment is to be made against unit of weight, the actual weight of items erected by contractor will be paid after assessing the weight on the basis of shipping list or standard engineering practice. BHEL engineer's decision will be final and binding on contractor in this regard.

12.3 PAYMENT FOR THE WORK COMPLETED

12.3.1
THE BIDDER SHALL QUOTE A LUMPSUM AMOUNT FOR THE COMPLETE BOQ & THE INDIVIDUAL ITEM RATE SHALL BE IN PROPORTION TO THE WEIGHTAGES SPECIFIED IN BOQ. PAYMENT WILL BE MADE BY BHEL ACCORDING TO THE DERIVED ITEM RATES, BREAK UP OF STAGE PAYMENTS AND ACTUAL EXECUTED QUANTITIES.

12.3.2 MEASUREMENT FOR PAYMENT

12.3.3
IN RATE SCHEDULES, ALL INCLUSIVE UNIT RATES HAVE BEEN CALLED FOR ENTIRE SCOPE OF WORK FOR RESPECTIVE ITEM INCLUDING ERECTION, CALIBRATION, TESTING AND COMMISSIONING AS APPLICABLE FOR VARIOUS DEVICE AND INSTRUMENT AND PAYMENT SHALL BE MADE AS PER SPLIT UP FURNISHED IN THE TABLE EARLIER IN THIS SECTION.

12.3.4
FOR ALL PAYMENT PURPOSE, MEASUREMENT SHALL BE MADE ON THE BASIS OF PHYSICAL MEASUREMENT. PHYSICAL MEASUREMENT SHALL BE MADE BY CONTRACTOR IN PRESENCE OF BHEL ENGINEER. CONTRACTOR SHALL MAINTAIN RECORDS FOR UTILIZATION OF MATERIAL SYSTEM-WISE.

12.3.5

ALL THE SURPLUS, SCRAP AND SERVICEABLE MATERIALS SHALL BE RETURNED BY THE CONTRACTOR TO BHEL'S STORES AS PER THE INSTRUCTION OF ENGINEER

12.3.6
ALL THE CABLES RETURNED TO STORES SHOULD CARRY ALUMINIUM TAG(S) INDICATING THE SIZE AND TYPE OF CABLES. CABLE OF MORE THAN FIVE -METER LENGTH IS TERMED AS "SERVICEABLE MATERIAL".

12.3.7
ANY ITEM RETURNED TO STORES SHALL BE CLEARLY IDENTIFIED AND TAGGED FOR ITS SERVICEABILITY OR ANY DEFECTS IN THE RETURNED ITEMS.

12.3.8
WHEREVER ADDITIONAL INSTRUMENTATION WORK HAS TO BE CARRIED OUT FOR PERFORMANCE GUARANTEE TEST, THE SAME HAS TO BE EXECUTED BY THE CONTRACTOR AS PER THE APPLICABLE RATES ALREADY PROVIDED IN THE RATE SCHEDULE.

SECTION-13
SPECIAL CONDITIONS OF CONTRACT

13.0 EXTRA CHARGES FOR RECTIFICATION AND MODIFICATION

SHALL BE AS PER GCC (GENERAL CONDITIONS OF CONTRACT) OF THIS TENDER

SECTION-14
SPECIAL CONDITIONS OF CONTRACT

14.0 INSURANCE

SHALL BE AS PER GCC (GENERAL CONDITIONS OF CONTRACT) OF THIS TENDER

SECTION-15
SPECIAL CONDITION OF CONTRACT

15.0 EARNEST MONEY DEPOSIT, SECURITY DEPOSIT & BANK GUARANTEE

SHALL BE AS PER GCC (GENERAL CONDITIONS OF CONTRACT) OF THIS TENDER

SECTION 16
SUSPENSION OF BUSINESS DEALING WITH CONTRACTORS
(w.e.f 18.05.09)

16.1 A bidder may be put on HOLD for a period of 6 months, for future tenders for specific works on the basis of one or more of the following reasons:

I. Bidder does not honour his own offer or any of its conditions within the validity period.
II. Bidder fails to respond against three consecutive enquires of BHEL.
III. After placement of order, Bidder fails to execute a contract.
IV. Bidder fails to settle sundry debt account, for which he is legitimately liable, within one year of its occurrence.
V. Bidder's performance rating falls below 60% in specific category.
VI. Bidder works are under strike/ lockout for a long period.

16.2 A Bidder may be de-listed from the list of registered Bidders of the region for a period of 1 year on the basis of one or more of the following reasons:-

I. Bidder tampers with tendering procedure affecting ordering process or commits any misconduct which is contrary to business ethics.
II. Bidder has substituted, damaged, failed to return, short returned or unauthorizedly
disposed off materials/ documents/ drawings/ tools etc of BHEL.
III. Bidder no longer has the technical staff, equipment, financial resources etc. required to execute the orders/ contracts.

16.3 A Bidder can be banned from doing any business with all Units of BHEL for a period of 3 years on the basis of one or more of the following reasons:

I. Bidder is found to be responsible for submitting fake/ false/ forged documents, certificates, or information prejudicial to BHEL's interest.
II. In spite of warnings, the Bidder persistently violates or circumvents the provisions of labour laws/ regulations/ rules and other statutory requirements.
III. Bidder is found to be involved in cartel formation.
IV. The Bidder has indulged in malpractices or misconduct such as bribery, corruption and fraud, pilferage etc which are contrary to business ethics.
V. The Bidder is found guilty by any court of law for criminal activity/ offences involving moral turpitude in relation to business dealings.
VI. The Bidder is declared bankrupt, insolvent, has wound up or been dissolved; i.e ceases to exist for all practical purposes.
VII. Bidder is found to have obtained Official Company information/ documentation by questionable means.
VIII. Communication is received from the administrative Ministry of BHEL to ban the Bidder from business dealings.

Section-17 (not applicable for this tender)

SECTION 18
REVERSE AUCTION PROCEDURE (Dtd 08/04/2010)

Business Rules, Terms & Conditions of Online Reverse Auction for the work of:

NAME OF THE WORK: Handling at Storage Yard/ Stores, Transportation to Site, Calibration, Erection, Testing, Commissioning, Final Painting and Handing over of Electrical and Control & Instrumentation Works of Co-Generation Plant comprising of HRSG(1X62TPH), 1 X Frame 6 Gas Turbine 1X33.3 MW, Steam Unit and their Auxiliaries, Piping etc. AT GUJARAT NARMADA VALLEY FERTILIZERS COMPANY LIMITED DISTT. BHARUCH (GUJARAT)
TENDER SPECIFICATION No. BHE/PW/PUR/BHU-CLE/726

BUYER'S NAME	BHARAT HEAVY ELECTRICALS LIMITED POWER SECTOR – WESTERN REGION
AUCTION TO BE CONDUCTED BY	**M/s. e-Procurement Technologies Ltd. (abcprocure)** B-705, Wall Street-II, Opp. Orient Club, Nr. Gujarat College, Ellis Bridge, Ahmedabad – 380 006, Gujarat, India. Ph. Nos. : +91 79 – 4001 6860 / 861 / 863 / 864 / 866 / 874 / 875 / 877 / 878 / 880 / 882 Fax No. : +91 79 – 4001 6876 / 816 **Auction Website: https://bhel.abcprocure.com**
DATE & TIME OF AUCTION	Auction Date : **(Shall be informed later)** *Online Sealed Bid Time : **(Shall be informed later)*** Online Reverse Auction Time :**(Shall be informed later)**)
DOCUMENTS ATTACHED	1) Business rules for reverse auction 2) Terms & conditions of reverse auction 3) Process Compliance Statement (Annexure II) 4) Final Price Confirmation (Annexure III) 5) Contact Information

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION

Against this Enquiry for the subject item/system with detailed scope of supply as per our specification, BHEL-PSWR may resort to "ONLINE REVERSE AUCTION PROCEDURE" i.e. **ONLINE BIDDING on INTERNET.**

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.
3. BHEL will inform the vendor in writing in case reverse auction, the details of service provider to enable them to contact and get trained.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to email a scanned copy of the Process Compliance Form (**Annexure II**) in the prescribed (provided by service provider) before start of Online Initial Sealed Bid. Without this form, the vendor will not be eligible to participate in the event.
6. ~~BHEL will provide the calculation sheet (e.g.: EXCEL sheet), if any, which will help to arrive at "Total Cost to BHEL" like packing & forwarding charges, Taxes and duties, Freight charges, Insurance, Service tax for services and loading factors (for non-compliance to BHEL standard Commercial terms and conditions.) for each the vendor to enable them to fill-in the price and keep it ready for keying in during the auction.~~
7. Reverse auction will be conducted on schedule date & time.
8. At the end of reverse auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to email a scanned copy of the price break-up & confirmation duly signed filled-in prescribed format (as per BHEL's price excel sheet) as provided on case-to-case basis to BHEL through service provider within 24 hours of the reverse auction without fail.
10. Any variation between the on-line bid value and sealed price bid will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.
11. In case BHEL decides not to go for Reverse auction procedure for this tender enquiry, the price bids and price impacts, if any already submitted and available with BHEL shall be opened as per procedures mentioned in the tender specifications.
12. Only those vendors, who participate in the Online Initial Sealed Bid, will be eligible to participate in the subsequent Online English Reverse Auction.
13. **The reverse auction will be treated as closed only when the bidding process gets closed in all respects for the item listed in the tender.**

Business Rules for finalization of the procurement

BHEL shall finalise the procurement of the item against this Tender through reverse auction mode. BHEL has made arrangement with **M/s. e-Procurement Technologies Ltd., Ahmedabad**, who shall be BHEL's authorized service provider for the same. Please go through the guidelines given below and submit your acceptance to the same along with your Commercial Bid.

1. Computerized reverse auction shall be conducted by BHEL, on pre-specified date, while the vendors shall be quoting from their own offices/ place of their choice. Internet connectivity shall have to be ensured by vendors themselves. In extreme case of failure of Internet connectivity, (due to any reason whatsoever may be) it is the bidders' responsibility / decision to send fax communication immediately to M/s. e-Procurement Technologies Ltd., Ahmedabad. Furnishing the price the bidder wants to bid online with a request to the service provider to upload the faxed price on line so that the service provider will up load that price on line on behalf of the Bidder. It shall be noted clearly that the concerned bidder communicating this price to service provider has to solely ensure that the fax message is received by the service provider in a readable / legible form and also the Bidder should simultaneously check up with service provider about the clear receipt of the price faxed. It shall also be clearly understood that the bidder shall be at liberty to send such fax communications of prices to be up loaded by the service provider only within the closure of Bid time and under no circumstance it shall be allowed beyond the closure of Bid time / reverse auction. It shall also be noted that the service provider should be given a reasonable required time by the bidders, to upload such prices online and if such required time is not available at the disposal of the Service provider at the time of receipt of the fax message from the bidders, the service provider will not be uploading the prices and either BHEL or the service provider are not responsible for this unforeseen circumstances. In order to ward-off such contingent situation bidders are requested to make all the necessary arrangements/ alternatives whatever required so that they are able to circumvent such situation and still be able to participate in the reverse auction successfully. Failure of power at the premises of vendors during the Reverse auction cannot be the cause for not participating in the reverse auction. On account of this, the time for the auction cannot be extended and neither BHEL nor M/s. e-Procurement Technologies Ltd., Ahmedabad is responsible for such eventualities.

2. e-Procurement Technologies Ltd. shall arrange to train your nominated person (s), without any cost to you. They shall also explain you, all the Rules related to the Reverse Auction / Business Rules Document to be adopted along with bid manual. You are required to give your compliance on it before start of bid process.

3. **MATERIAL FOR BID**: Scope of Work as detailed in Tender Specification No: **BHE/PW/PUR/BHU-CLE/726**

4.

5. **Starting Bid/Bid Decrement:** The opening price of the RA and the bid decrement value can be viewed by the bidders on the bidding screen.

6. **BIDDING CURRENCY AND UNIT OF MEASUREMENT:** Bidding and evaluation will be conducted in **Indian Rupees (INR)** of the item. The price bid placed during the "Sealed Bid Auction" as well as "Reverse Auction" shall

be the total amount for the entire Scope of Work as mentioned in Price Bid Specification of Tender Specification No **BHE/PW/PUR/BHU-CLE/726**

7. **BID PRICE**: The Bidder has to quote the Total Cost to BHEL for the entire Scope of work. Calculation sheet to arrive at the Total Cost to BHEL will be provided by BHEL if required.

8. The technical & commercial terms are as per BHEL Tender Specification No **BHE/PW/PUR/BHU-CLE/726**. Vendors technical and commercial bid and subsequent correspondences between BHEL and the vendors regarding commercial terms & conditions.

9. **VALIDITY OF BIDS**: The Bid price shall be firm for a period mentioned in the subject tender and shall not be subjected to any change whatsoever.

10. At the end of the reverse auction, bidder has to provide a detailed price break-up & price confirmation for his lowest offer, as per the Annexure III format, within 24 hours of the reverse auction.

11. Procedure of Reverse Auctioning:

i. **Online Initial Sealed Bid:** The opening bid (In the initial auction) of the bidders shall place a bid which shall be same as that quoted in their Final Sealed price submitted to BHEL or lesser. The bidders shall confirm in writing to BHEL that their opening bid shall be same as that quoted in their final sealed price bid submitted against Tender Specification No **BHE/PW/PUR/BHU-CLE/726**. If it is found to be otherwise at a later date, the bidder will be disqualified from the tender.

ii. **Online English Reverse (no ties) Auction {Reverse Auction}**: BHEL will declare its **Opening Price** (**OP**), which shall be visible to the all vendors during the start of the reverse Auction. You will be required to start bidding after announcement of Opening Price and decrement amount. Also, please note that the start price of an item in online reverse auction is open to all the participating bidders. Any bidder can start bidding, in the online reverse auction, from the start price itself. If the start price is your own price, you still need to bid in the online reverse auction. Also, please note that the first online bid that comes in the system during the online reverse auction can be equal to the auction's start price, or lesser than the auction's start price by one decrement, or lesser than the auction's start price by multiples of decrement. The second online bid and onwards will have to be lesser than the L1 rate by one decrement value, or lesser than the L1 rate by multiples of the decrement value.

iii. The vendor's who have participated in the Initial Sealed Bid Auction will only be eligible to participate in the subsequent English Reverse Auction.

iv. Online Initial Sealed Bid will be for **30 minutes** and Online English Reverse (no ties) Auction shall be for a **period of one hour**. If a bidder places a bid in the last 10 minutes of closing

of the Reverse Auction and if that bid gets accepted, then the auction's duration shall get extended automatically for another 10 minutes, for the entire auction, from the time that bid comes in. Please note that the auto-extension will take place only if a bid comes in those last 10 minutes and if that bid gets accepted. If the bid does not get accepted, the auto-extension will not take place even if that bid might have come in the last 10 minutes. In case, there is no bid in the last 10 minutes of closing of Reverse Auction, the auction shall get closed automatically without any extension. However, vendors are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc.

v. The bid decrement amount shall be specified by BHEL before start of bidding.

~~vi. Any commercial loading shall be intimated to bidders in advance and it shall be added to price during dynamic auction process. For evaluation purpose, commercial loading if any, shall be added to the quoted price of respective bidder. However for ordering only the final bid placed by you shall be considered.~~

~~vii. After the completion of English Reverse (no ties), the **Closing Price** (**CP**) shall be available. In case, any commercial loading was made to L1 bidder's price, it shall be de-loaded from the closing price of L1 bidder (**CP**) for further processing.~~

viii. **The ratio of CP and originally quoted price shall be applied on all elements of originally quoted prices to arrive at the final price break up**.

12. Successful vendor shall be required to submit the final prices, quoted during the English Reverse (no ties) in the **Annexure III Format** after the completion of Auction to BHEL, duly signed and stamped as token of acceptance without any new condition other than those already agreed to before start of auction.

13. During the Online English Reverse (No Ties) Auction, if no bid is received in the auction system/website within the specified time duration of the reverse auction, then **BHEL**, at its discretion, may decide to revise the auction's Opening Price / scrap the online reverse auction process / proceed with the conventional mode of tendering (opening of the hard copy final bids submitted by you earlier to BHEL).

14. Your bid will be taken as an offer to supply. Bids once made by you, cannot be cancelled / withdrawn and you shall be bound to supply as mentioned above at your final bid price. **Should you back out and not supply as per the rates quoted, BHEL shall take action as appropriate**.

15. You shall be assigned a **Unique User Name** & **Password** by BHEL (or) e-Procurement Technologies Ltd. **You are advised to change the Password** and edit the information in the Registration Page after the receipt of initial Password from BHEL / e-Procurement Technologies Ltd. to ensure

confidentiality. All bids made from the Login ID given to you will be deemed to have been made by your company.

16. You will be able to view the following on your screen along with the necessary fields in the English Reverse (no ties) {Reverse Auction}:
    a. Leading Bid in the Auction (only total price)
    b. Bid Placed by you
    c. Your Own Rank
    d. Opening Price & Bid Decrement value.

17. At the end of the Reverse Auction, BHEL will decide upon the winner. BHEL's decision on award of Contract shall be final and binding on all the Bidders.

18. BHEL shall be at liberty to cancel the reverse auction process / tender at any time, before ordering, without assigning any reason.

19. BHEL shall not have any liability to bidders for any interruption or delay in access to the site irrespective of the cause.

20. Other terms and conditions shall be as per your techno-commercial offers and other correspondences till date.

21. You are required to submit your acceptance (Process Compliance Form - Annexure II) to the terms/ conditions/ modality given above before participating in the reverse auction.

Terms & Conditions of Reverse Auction

1. **LOG IN NAME & PASSWORD:** Each Bidder is assigned a Unique User Name & Password by e-Procurement Technologies Ltd. The Bidders are requested to change the Password and edit the information in the Registration Page after the receipt of initial Password from e-Procurement Technologies Ltd., Ahmedabad. All bids made from the Login ID given to the bidder will be deemed to have been made by the bidder.

2. **BIDS PLACED BY BIDDER:** The bid of the bidder will be taken to be an offer to execute the work. Bids once made by the bidder cannot be cancelled. The bidder is bound to execute the work the as mentioned above at the price that they bid. Should any bidder back out and not make the supplies at per the rates quoted, BHEL and / or e-Procurement Technologies Ltd., Ahmedabad shall take action as appropriate.

3. **LOWEST BID OF A BIDDER:** In case the bidder submits more than one bid, the lowest bid will be considered as the bidder's final offer to execute the work.

4. **AUCTION TYPE:** 1). Online Initial Sealed Bid

   2). Online English Reverse (No Ties) Auction (refer Bidder Manual for details)

5. **DURATION OF AUCTION**: The duration of Auction will be for one hour. If a bidder places a bid in the last 10 minutes of closing of the Reverse Auction and if that bid gets accepted, then the auction's duration shall get extended automatically for another 10 minutes, for the entire auction, from the time that bid comes in. Please note that the auto-extension will take place only if a bid comes in those last 10 minutes and if that bid gets accepted. If the bid does not get accepted, the auto-extension will not take place even if that bid might have come in the last 10 minutes. In case, there is no bid in the last 10 minutes of closing of Reverse Auction, the auction shall get closed automatically without any extension. However, vendors are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc. (THIS SCHEDULE IS TENTATIVE. IF ANY CHANGE IN SCHEDULE, THE SAME SHALL BE COMMUNICATED TO YOU)

6. **BID DECREMENT**: The minimum Bid decrement shall be available to the Bidders at the start of the auction. The bidder can view the same by clicking on the Item details at the start of the auction. The bidder can bid lower than the Lowest Bid in the auction by a decrement, multiple of the minimum Bid decrement or at least of minimum bid decrement plus multiples of Bid Decrement. Also, please note that the start price of an item in online reverse auction is open to all the participating bidders. Any bidder can start bidding, in the online reverse auction, from the start price itself. If the start price is your own price, you still need to bid in the online reverse auction. Also, please note that the first online bid that comes in the system during the online reverse

auction can be equal to the auction's start price, or lesser than the auction's start price by one decrement, or lesser than the auction's start price by multiples of decrement. The second online bid and onwards will have to be lesser than the L1 rate by one decrement value, or lesser than the L1 rate by multiples of the decrement value.

7. **VISIBLITY TO BIDDER:** The Bidder shall be able to view the following on his screen along with the necessary fields during English Reverse –NO ties Auction:

   - Leading Bid in the Auction
   - Bid Placed by him
   - His Own Rank
   - Start Price & Bid Decrement Value

8. **AUCTION WINNER:** At the end of the Reverse Auction, BHEL will evaluate all the bids submitted and will decide upon the winner.

9. **PROXY BIDS**: Proxy bidding feature is a pro-supplier feature to safe guard the supplier's interest of any Internet failure or to avoid last minute rush. The Proxy feature allows Bidders to place an automated bid against other Bidders in an auction and bid without having to enter a new amount each time a competing Bidder submits a new offer.

The bid amount that a Bidder enters is the minimum that the Bidder is willing to offer. Here the software bids on behalf of the supplier.

- **The proxy amount is the minimum amount that the Bidder is willing to offer. During the course of bidding, the Bidder cannot delete or change the amount of a Proxy Bid.**

- **Bids are submitted in decrements (decreasing bid amounts). The application automates proxy bidding by processing proxy bids automatically, according to the decrement that the auction originator originally established when creating the auction, submitting offers to the next bid decrement each time a competing Bidder bids, regardless if competing bids are submitted as proxy or standard bids.**

- **This feature can be used only once during a particular Reverse Auction and only after the L1 rate is equal to or less than the minimum bid amount that the bidder has put in the system will he get the option to manually bid for the same. In no case during the bidding till the L1 rate or less is not reached as equivalent to the minimum bid amount offered by the bidder, will the bidder get the option to manually bid for the same.**

GENERAL TERMS & CONDITIONS: Bidders are required to read the "Terms and Conditions" section of the auction website (https://bhel.abcprocure.com) using the Login IDs and passwords given to them.

10. **OTHER TERMS & CONDITIONS:**

- **The Bidder shall not involve himself or any of his representatives in Price manipulation of any kind directly or indirectly by communicating with other suppliers / bidders.**

- The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

- BHEL's decision on award of Contract shall be final and binding on all the Bidders.

- BHEL along with e-Procurement Technologies Ltd., Ahmedabad can decide to extend, reschedule or cancel any Auction. Any changes made by BHEL and / or e-Procurement Technologies Ltd., after the first posting will have to be accepted if the Bidder continues to access the site after that time.

- e-Procurement Technologies Ltd., shall not have any liability to Bidders for any interruption or delay in access to the site irrespective of the cause.

- e-Procurement Technologies Ltd., is not responsible for any damages, including damages that result from, but are not limited to negligence.

- e-Procurement Technologies Ltd., will not be held responsible for consequential damages, including but not limited to systems problems, inability to use the system, loss of electronic information etc.

N.B.

- All the Bidders are required to submit the Agreement Form / Process Compliance Form **(Annexure - II)** duly signed to M/s e-Procurement Technologies Ltd., Ahmedabad before the due date (auction date). After the receipt of the Agreement Form, Login ID & Password shall be allotted to the suppliers (bidders).

- After the completion of the Auction event, all the Bidders have to submit the Price Break-up & confirmation as per the Annexure III format, within 24 hours of the reverse auction, to M/s e-Procurement Technologies Ltd., Ahmedabad for further proceedings.

ANNEXURE- I

The List of Items to be procured along with the Quantities and the Auction Start Time & Close Time is as follows:

DESCRIPTION OF WORK:

NAME OF THE WORK: Handling at Storage Yard/ Stores, Transportation to Site, Calibration, Erection, Testing, Commissioning, Final Painting and Handing over of Electrical and Control & Instrumentation Works of Co-Generation Plant comprising of HRSG(1X62TPH), 1 X Frame 6 Gas Turbine 1X33.3 MW, Steam Unit and their Auxiliaries, Piping etc. AT GUJARAT NARMADA VALLEY FERTILIZERS COMPANY LIMITED DISTT. BHARUCH (GUJARAT)
TENDER SPECIFICATION No. BHE/PW/PUR/BHU-CLE/726

Item	Quantity	Opening Prices in Rs	Bid Decrement in Rs	Opening Time	Closing Time
As Detailed IN subject tender	As Detailed IN subject tender	Would be displayed on the bidding screen	Would be displayed on the bidding screen	**Shall be informed later**	**Shall be informed later**

Annexure- II

Process Compliance Form

(The bidders are required to print this on their company's letterhead, sign & stamp before emailing a scanned copy)

To,
M/s. e-Procurement Technologies Ltd. (abcprocure)
B-705, Wall Street-II, Opp. Orient Club,
Nr. Gujarat College, Ellis Bridge,
Ahmedabad – 380 006, Gujarat, India.

Sub: Agreement to the Process related Terms and Conditions for the Reverse Auction

Dear Sir,

This has reference to the Terms & Conditions for the Reverse Auction mentioned in the Tender Specification No BHE/PW/PUR/BHU-CLE/726

This letter is to confirm that:

1) The undersigned is authorized representative of the company.
2) We have studied the Commercial Terms and the Business rules governing the Reverse Auction as mentioned in your letter and confirm our agreement to them.
3) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.
4) We also confirm that we will email a scanned copy or fax the Price Confirmation (Annexure-III) & break-up (as per Excel Sheet), if any, of our online quoted price, immediately after the completion of the Reverse Auction.
5) We, hereby, confirm that we will honor the Bids placed by us during the auction process.
6) We confirm that we have changed the password on the auction website after first log in.

With regards,

Signature with company seal
Name –
Company / Organization –
Designation within Company / Organization –
Address of Company / Organization –

- Scan & email this document to **abcprocure**.

Annexure III

Price Confirmation

(To be submitted by the bidder on their Letterhead, duly stamped & signed after the completion of the Reverse Auction)

To,
M/s. e-Procurement Technologies Ltd. (abcprocure)
B-705, Wall Street-II, Opp. Orient Club,
Nr. Gujarat College, Ellis Bridge,
Ahmedabad – 380 006.
Gujarat, India.

Sub: Final price quoted during Reverse Auction

Ref : 1. BHEL Tender Specification No **BHE/PW/PUR/BHU-CLE/726**
2. Reverse Auction dtd. (Shall be informed later)
3. Our Offer No. dtd.

Dear Sir,

We confirm that we have quoted.

1. _____
2. _____

(Price quoted on Total Cost to BHEL basis)

as our final lump sum prices during the Reverse Auction conducted on _____ (date).

Thanking you and looking forward to the valuable order from BHEL.

Yours sincerely,

For _____

Name:
Company:
Date:
Seal:

CONTACT INFORMATION

M/s. e-Procurement Technologies Ltd., Ahmedabad (abcprocure)	Bharat Heavy Electricals Limited, PSWR
B-705, Wall Street-II, Opp. Orient Club, Nr. Gujarat College, Ellis Bridge, Ahmedabad – 380 006, Gujarat, India. Ph. Nos. : +91 79 – 4001 6860 / 861 / 863 / 864 / 866 / 874 / 875 / 877 / 878 / 880 / 882 Fax Nos. : +91 79 – 4001 6876 / 816 Helpdesk Email-Id: helpdesk@tendertiger.com Mr. Parin Desai Cell : 0 – 93745 19754 E-mail : parin@abcprocure.com	Mr Santosh Nair Sr Deputy General Manager/Purchase E mail : snair@bhelpswr.coin Phone : 0712 - 3048645 Fax : 0712 - 3048605 (Or) Mr. S M BORKAR SR.Manager/Purchase Email : smborkar@bhelpswr.co.in Phone: 0712 - 3048639 Fax : 0712 - 3048605 (Or) Mr. Pratish Gee Varghese Engineer/Purchase Email: pgv@bhelpswr.co.in Phone: 0712 - 3048713 Fax : 0712 - 3048605

Appendix- I

Details (wherever required) of items listed in the rate schedule

Please Note:

1. All the items in general are to be erected and commissioned by the contractor, unless specifically mentioned otherwise.
2. In such cases where systems are described with component quantities (viz., Vibration monitoring systems, Lube Oil skids, etc., etc.) lumpsum rates are to be quoted. No separate payment will be made for the component items of those systems, although these systems may have certain items for which separate unit rates are also available elsewhere.
3. The dimensions and weights mentioned are only approximate. No extra claims will be entertained due to change in dimensions/weight.

- Sl No N1.20:

Steam and Water analysis system

The scope of work includes all equipments including recorders etc, which may be fitted in any of the panels. Ph, sensors (4 nos.) conductivity analyzer (4 nos.), silica analyzer, multi channel (2 nos.), etc. and sensors for these analyzers will be supplied loose with integral / prefab cables, to be mounted and wired up in relevant panels.

- Sl No. B.1

Modification and Expansion in existing 11 KV Switchboard:

Supply, Erection, Testing & Commissioning by Vendor for Modification job in 3 Panels, And Expansion by 1 panel in existing 11 KV switch gear is by PSWR/site.

APPENDIX–II

TENTATIVE LIST OF MAJOR TOOLS & PLANTS & MMD TO BE BROUGHT BY THE CONTRACTOR

A. T&P FOR ELECTRICAL/C&I WORKS

SN	DESCRIPTION	MINIMUM QUANTITY
01	TRANSFORMER OIL PURIFICATION PLANT WITH VACUUM PUMP FOR EVACUATION OF TRANSFORMER ALONGWITH ACCESSORIES & HOSES. A) CAPACITY 5000/6000 LTR PER HOUR B) CAPACITY 2000/2500 LTR.PER HOUR C) CAPACITY 750/1000 LTR. PER HOUR	 1 NO. 1 NO. 1 NO.
02	TRANSFORMER OIL TRANSFER/STORAGE TANK WITHSTANDING FULL VACUUM CAP. 10 KILOLITRES	2 NOS
03	PRIMARY INJECTION KIT UPTO 10000 AMPS	1 NO.
04	SECONDARY INJECTION KIT WITH INTEGRAL TIMER FOR RELAY TESTING	1 NO.
05	1 Phase/3 PHASE VARIAC	1 NO. EACH
06	SINGLE PHASE VARIAC 28 AMPS	1 NO.
07	TRANSFORMER TURNS RATIO TEST KIT	1 NO.
08	HV TEST KIT AC, 0 –50 KV &DC, 0- 100 KV PREFERSBLY WITH DRY TYPE TRANSFORMER	1 NO. EACH
09	TRANSFORMER OIL BDV TEST KIT 0-100 KV WITH 2.5MM AIR GAP.	1 NO.
10	PORTABLE AIR COMPRESSOR WITH DRIER AND REGULATOR MAKE “TOSHNIWAL”/”KHOSLA” RATED FOR 7/10 KG/CM2	1 NO.
11	SOLDERING IRON “SOLDRON” MAKE 25 WATT	2 NOS.
12	VACUUM PUMP	1 NO.
13	MULTIMETRES	
	V) DIGITAL 3 1/2 DIGIT OF REPUTED MAKE b> ANALOG MOTWANE MAKE c> DIGITAL 4 1/2 DIGIT OF REPUTED MAKE	6 NOS. 3 NOS. 2 NO.
14	STANDARD MILLI AMPS/MILLIVOLTS SOURCE MAKE RANGE 0 TO 60 mA AND 0 TO 100 mV	2 NO.
15	INSULATION TESTER HAND OPERATED 25OV/500V/1000 V RATED MAINS/BATTERY OPERATED	1 NO. EACH
16	INSULATION TESTER MAINS OPERATED 2500/5000V	2 NO.

SN	DESCRIPTION	MINIMUM QUANTITY
17	DC POWER SUPPLY 0 TO 250 V DC, 5 A MAKE “APLAB” OR EQUIVALENT (VARIABLE SOURCE)	2 NO
18	PHASE SEQUENCE INDICATOR	1 NO.
19	FREQUENCY SOURCE 45 TO 55 HZ WITH 110V	1 NO.
20	TONG TESTER AC 5/10, 25/60/300 AMP RANGE REPUTED MAKE	1 NO. EACH
21	TONG TESTER DC 30/60/300 AMP	1 NO.
22	STOP WATCH	1 NO.
23	CONTAINER FOR TRANSFORMER OIL SAMPLING	10 NOS.
24	TARPOLIN FIRE PROOF	As required
25	DC SHUNT 400 AMP 75 MV	1 NO.
26	3 PHASE SHIFTER	1 NO.
27	INDUSTRIAL TYPE VACUUM CLEANER	1 NO.
28	MICRO OHM METER	1 NO.
29	DECADE RESISTANCE BOX	2 NOS.
30	TELETALK 2 WIRE SYSTEM	6 SETS
31	PORTABLE BLOWER WITH HEATING ARRANGEMENT	1 NO.
32	TORQUE WRENCH (12-60Nm, 50-225 Nm)	1 NO EACH
33	WATTMETER AC/DC 0-125-250V, 0-5-10A	1 NO
34	OSCILLOSCOPE	1 NO
35	TACHOMETER NON CONTACT TYPE 0 to 4000 RPM	1 NO
36	TAN DELTA TEST KIT	1 NO
37	OIL SPECIFIC GRAVITY AND PPM MEASURING INSTRUMENT	1 NO
38	RHEOSTAT	3 NOS
39	POLARITY TEST KIT	1 NO
40	NON – CONTACT TYPE DIGITAL THERMOMETER	1 NO
41	RELAY TESTING KIT	1 NO
42	FERRULE PRINTING MACHINE	1 NO
43	PHANTAM LOAD KIT	1 NO
44	Dead weight tester rated 400 Kg/cm2 and with weights and test gauge facility. Make ‘Budenberg or ‘Ravika’	1 no.
45	Oil temperature bath suitable to calibrate the instruments range 0 – 200 deg. C with standard temperature gauges and thermostatic control	2 nos.
46	Muffle furnace – 800 deg. C with standard temperature gauges	1 no.
47	Standard gauges 12” dial size make “Budenberg” or ”H Guru” or “Odin”	

	A) – 1-0 kg/cm2 pressure gauge(vacuum gauge) B) 0 – 5 or 6 kg/cm2 pressure gauge C) 0 – 10 kg/cm2 – do – D) 0 – 25 kg/cm2 – do – E) 0 – 60 kg/cm2 – do – F) 0 – 100 kg/cm2 –do – G) 0 – 250 kg/cm2 – do – H) 0 – 600 kg/cm2 – do – I) 0.2 to 1 kg -- do --	1 no. 1 no. 1 no. 1 no. 1 no. 1 no. 1 no. 1 no. 1 no.
48	Manometers (+/-) 1000 mm water column With hand bulb for lab and small manometers for field purpose.	2 nos.
49	Manometer (+/-) 500mm mercury column with hand bulb for lab and small manometer for field purpose.	1 no.
50	Inclined manometer (+/-) 300 mm water column	1 no.
51	Glass thermometer 0-120 deg. C, 0-200 deg.c and 0-600 deg.c	1 no. Each
52	RTD/Pt 100 source	1 nos.
53	Decade resistance box	1 sets.
54	Function generator	1 no.
55	Vacuum pump for Power Transformer	1 no.

Note:
Instruments shown above are for the regular works only. However, separate sets of tools and instruments are to be arranged and provided to commissioning gang. If contractor fails to arrange the testing instruments as listed above, BHEL site will arrange the instruments at the cost of contractor. Contractor to submit calibration report from recognized agency prior to deployment of same at site and periodical calibration of the same to be arranged by contractor as per procedure of BHEL.

B. T&P FOR MECHANICAL WORK

SN	DESCRIPTION	MINIMUM QUANTITY
	HANDLING EQUIPMENTS	
1	TURN BUCKLES	AS PER REQMT
2	'D' SHACKLES	AS PER REQMT
3	STEEL WIRE ROPES	AS PER REQMT
4	MANILA ROPES	AS PER REQMT
5	CHAIN PULLEY BLOCK/TIRFUR	AS PER REQMT
	MAJOR T&P	
1	PIPE BENDING MACHINE – 2" SIZE	2 NOS
2	ELECTROHYDRAULIC PIPE BENDING MACHINE	1 NO.
2	GRINDING MACHINE	4 NOS
3	DRILLING MACHINES 1/4", 1/2", 3/4" & 1"	1 NO. EACH
4	COPPER TUBE BENDER AND CUTTER SIZES 6MM, 8MM, 1/2", 1/4"	1 NO. EACH
5	DYE SETS FOR THREADING UPTO 2" PIPE.	2 NOS
6	SPIRIT LEVEL	2 NOS.
7	TAP SETS FOR BOTH BSP AND MPT THREADS UPTO 1" EACH	1 SET EACH
8	MEASURING INSTRUMENTS LIKE MICROMETRES AND CALIPERS	1 SET EACH
9	WELDING GENERATORS	3 NO.
10	WELDING TRANSFORMER	3 NO.
11	TIG WELDING SET	2 NO.
12	MECHANICAL TOOL KIT FOR FITTERS	4 NOS.
13	ELECTRICIAN TOOL KIT	4 NOS.
14	CRIMPING TOOLS	4 NOS.
15	FLOOD LIGHT FITTINGS	5 NOS.
16	FIRE EXTINGUISHERS	3 NOS.
17	DISTRIBUTION BOARDS WITH POWER CABLE COMPLETE AS REQUIRED	1 SET
18	PAINTING BRUSH	AS PER REQMT.
19	FIRE PROOF TARPAULIN	AS PER REQMT.
20	SAFETY BELTS AND SAFETY HELMETS	AS PER REQMT
21	24V A/C TRANSFORMER & HAND LAMPS	4 NOS.
22	MIG WELDING MACHINE WITH ACCESSORIES AIR COOL TYPE	2 NOS.
23	CRIMPING TOOL HYDRAULIC UPTO 600 SQ.MM	1 NO.
24	TORQUE WRENCH SET	1 SET
25	ELECTRODE DRYING OVENS	AS REQUIRED
26	FERRULE PRINTING MACHINE	2 NOS.
27	HYDRAULIC JACKS 250T CAPACITY/100T	4 NOS.EACH
28	TUFFER CAPACITY 15T	2 NOS.
29	CHAIN PULLEY BLOCKS 5/10T	1 NO.EACH

30	MOBILE PICKUP / CARRY CRANE (SUITABLE CAPACITY)	AS PER REQMT.
31	TRUCK / TRAILER	AS PER REQMT.

OTHER THAN THE ABOVE, ONE COMPUTER, PRINTER AND OTHER NECESSARY PERIPHERALS WILL HAVE TO BE MAINTAINED BY THE CONTRACTOR IN HIS SITE OFFICE.

NOTE:

THE LIST OF INSTRUMENTS / EQUIPMENTS TO BE BROUGHT BY THE CONTRACTOR AS SHOWN ABOVE SECTIONS A AND B **ARE ONLY INDICATIVE**. ANY OTHER INSTRUMENTS / EQUIPMENTS REQUIRED FOR THE EXECUTION OF THE WORK IS TO BE NECESSARILY ARRANGED BY THE CONTRACTOR WITHIN THE QUOTED RATES.

THE TESTING/CALIBRATION INSTRUMENTS WHICH ARE USED TO BE DULY CALIBRATED IN THE INTERVAL PRESCRIBED BY BHEL ENGINEERS FROM THE REPUTED AGENCIES DECIDED BY BHEL AND TEST CERTIFICATE TO BE FURNISHED.

APPENDIX–IIIA

CONSUMABLES TO BE ARRANGED BY CONTRACTOR

1. PRINTED FERRULES.

   PVC NUMBERED FERRULES ALSO TO BE ARRANGED FOR SUCH PLACES WHERE PRINTED FERRULE CANNOT BE USED.

2. CRIMPING TYPE COPPER LUGS UPTO SIZE 4 SQMM,
3. CABLE IDENTIFICATION TAGS
4. CABLE DRESSING & CLAMPING MATERIAL,
5. PVC CABLE TIES
6. G.I. CLAMPS FOR IMPULSE PIPES/ AIR LINES/COPPER TUBING, TEFLON TAPES FOR SEALING ETC.
7. WELDING ELECTRODE & OTHER CONSUMABLE.
8. ALL PRIMER AND PAINTS UNDER THE SCOPE
9. FASTNERS FOR INSTRUMENT MOUNTING.
10. ANCHOR FASTNER

NOTE: - The above listed consumable is only indicative, however the contractor shall arrange consumables as per work requirement.

BHEL shall provide only cable glands, cable lugs above 4 sq mm size and HT cable jointing kits.

Appendix-IIIB

Consumables/items to be provided by BHEL free of charge

01 Metallic Cable glands

02 Lugs above 4 sq. mm. size

APPENDIX–IV

FORMAT FOR MONTHWISE MANPOWER DEPLOYMENT PLAN

(CATEGORYWISE NUMBERS TO BE INDICATED FOR EACH MONTH FOR TOTAL CONTRCT PERIOD OF 10 MONTHS)

SL. NO.	CATEGORY	MONTH							
		1	2	3	4	5	6	7	8
01	RESIDENT ENGINEER								
02	ERECTION ENGINEERS								
03	COMISSIONING ENGINEERS								
04	ERECTION SUPERVISORS								
05	COMISSIONING SUPERVISORS								
06	QUALITY ASSURANCE ENGINEER								
07	SAFETY ENGINEER								
08	MATERIALS MANAGEMENT SUPERVISORS								
09	STRUCTURAL & OTHER WELDERS								
10	STORE KEEPERS								
11	ELECTRICIANS/ INSTRUMENT TECHNICIAN								
12	SEMISKILLED/ UNSKILLED WORKERS								
	MONTH WISE TOTAL								

APPENDIX–V

FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOLS AND PLANTS

CATEGORYWISE NUMBERS TO BE INDICATED FOR EACH MONTH FOR TOTAL CONTRCT PERIOD OF 10 MONTHS)

SL. NO.	DESCRIPTION & CAPACITY OF T&P	MONTHS							
		1	2	3	4	5	6	7	8
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									

APPENDIX-V I

CONCURRENT COMMITMENTS

SL. NO.	FULL POSTAL ADRESS OF CLIENT AND NAME OF OFFICER IN-CHARGE	DESCRIPTION OF THE WORK	VALUE OF THE CONTRACT	COMMENC-EMENT DATE	SCHEDU-LED COMPLE-TION	% COMPL-TD. AS ON DATE	ANTICIPA-TED COMPLN. DATE	REMARKS

DATE:

SIGNATURE OF THE BIDDER

APPENDIX–VII

DETAILS OF SIMILAR WORK DONE DURING THE LAST SEVEN YEARS

SL. NO.	FULL POSTAL ADDRESS OF CLIENT & NAME OF OFFICER IN CHARGE	DESCRIP-TION OF WORK	VALUE OF CONTRACT	DATE OF AWARD OF WORK	DATE OF COMMENCE MENT OF WORK	ACTUAL COMPLETION TIME (MONTHS)	DATE OF ACTUAL COMPLETION OF WORK	REMARKS
1								
2								
3								
4								
5								
6								

BIDDERS SHALL ENCLOSE COPIES OF DETAILED WORK ORDER (GIVING BILL OF QUANTITIES AND SCOPE OF WORK) AND COMPLETION CERTIFICATE IN SUPPORT OF THIS STATEMENT. BIDDER MAY USE SEPARATE SHEET AS REQUIRED

APPENDIX –VIII

RELAY TESTING FACILITY

(Mark the appropriate option)

Relay testing facility will be provided by:-

Sl No.	**Options**	**Mark the appropriate option**
1	By Bidder	
2	Any of the agencies recommended by BHEL	
3	Outsourced to the agency other than those recommended by BHEL	

NOTE :

1. Incase option 1 is chosen, the bidder have to submit the evidence of their resources and resourced capability to take up the relay testing along with their offer.
2. Incase option 3 is chosen, the bidder have to submit sufficient proof and credentials of experience of the party along with their offer.

DATE SIGNATURE OF BIDDER

APPENDIX-IX
ANALYSIS OF UNIT RATE QUOTED

SN	DESCRIPTION	% OF QUOTED RATE	REMARKS
01	SITE FACILITIES VIZ., ELECTRICITY, WATER OTHER INFRASTRUCTURE.		
02	SALARY AND WAGES + RETRENCHMENT BENEFITS		
03	CONSUMABLES		
04	T&P DEPRECIATION & MAINTENANCE		
05	ESTABLISHMENT & ADMINISTRATIVE EXPENSES		
06	OVERHEADS		
07	PROFIT		
	TOTAL	100%	